
**COLORADO DEPARTMENT OF TRANSPORTATION
DISPARITY STUDY UPDATE**

SUBMITTED TO:

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APRIL 6, 2001

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1.0 INTRODUCTION

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The Colorado Department of Transportation (CDOT) contracted with MGT of America, Inc., to conduct an update of the 1998 Disparity Study. This update will be used to develop overall Disadvantaged Business Enterprise (DBE) goals for design and construction contracts. The method of goal setting is based on the federal program laws. The foundation for the federal program is section 1101(b) of the Transportation Equity Act for the 21st Century (TEA-21), codified by Congress on June 9, 1998, as Public Law 105-178. The DBE goal recommendations are designed to comply with the regulations set forth by the United States Department of Transportation (USDOT), Title 49, Part 26 of the Code of Federal Regulations (CFR).

This report is presented in a format based on the USDOT model. MGT modified it slightly to detail the data analysis process so that CDOT staff can use it as a future model. To develop this report, MGT reviewed and analyzed the federally funded contracts issued by CDOT between October 1, 1996, and March 31, 2000. As required by the USDOT, overall recommended goals for 2001 were separated into race- and gender-preference goals and race- and gender-neutral goals.

The USDOT has designed a two-step process for developing overall DBE goals:

- Step One – Determine a base figure for the relative availability of DBE firms; and
- Step Two – Examine all of the available evidence within a jurisdiction to determine what adjustment, if any, is needed to the base figure.

In designing the methodology, MGT reviewed and analyzed the Final Rule and Guidance provided in the February 2, 1999, issue of the *Federal Register*. Commentary on Section 26.45 of 49 CFR 26 (Vol. 64, FR No. 21, p. 5111), addressing the Key Points of the Final Rule's discussion of reviews and responses to the Supplemental Notice of Proposed Rulemaking, provides specific guidance that states:

There are hundreds of existing disparity studies that contain a wealth of statistical and anecdotal evidence on the utilization of disadvantaged businesses. In addition to being a possible source of data for Step 1 of the goal setting process, disparity studies should be considered during Step 2 of the process. The base figure from Step 1 is intended to determine the relative availability of DBEs. The data and analysis in a disparity study can help a recipient determine whether those existing businesses are under- or over-utilized. If a recipient has a study with disparity ratios showing that existing DBEs are receiving significantly less work than expected, an upward adjustment from the base figure is called for. Similarly, if the disparity ratio shows overutilization, a downward adjustment to the base figure would be warranted....Finally, disparity studies that are conducted within a recipient's jurisdiction should be examined even if they were not done specifically for the recipient.

Based upon the guidance presented above, MGT conducted disparity analyses of CDOT's federally funded contracts and adjusted the relative availability of DBE firms in accordance with their under/overutilization and other factors specific to the CDOT local market.

This report is set up in such a way as to completely detail each task associated with Step One and Step Two of the USDOT model. Analyses are provided for design and construction business categories. Separate analyses were performed for design and construction procurements grouped by certified minority classifications. Race- and gender-neutral and race- and gender-preference goals were then recommended for each category. Including this introductory chapter, this report consists of the following three chapters:

- Chapter 1.0 - Introduction
- Chapter 2.0 - Methodology
- Chapter 3.0 - Analyses.

2.0 METHODOLOGY

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A major objective of this study is to determine the percentage of Disadvantaged Business Enterprise (DBE) and non-DBE businesses available to participate in the procurement of design and construction projects by the Colorado Department of Transportation (CDOT) and to determine whether DBE or non-DBE businesses have been underutilized or overutilized. This chapter will outline in detail the following:

- Data Management
 - Disadvantaged Business Enterprise (DBE) Classifications;
 - Emerging Small Business (ESB) Enterprises Classifications; and
 - Collection and Management of Data.
- Step One Methodology
 - Market Area;
 - Utilization;
 - Availability;
 - Capability;
 - Disparity; and
 - Weighting by Dollars Expended.
- Step Two Methodology
 - Median Past Participation;
 - Impact of the Southeast Corridor Project; and
 - Goal Setting.

2.1 Data Management

This section details the parameters for the study, including the collection and management of data. CDOT's relevant market area and the utilization and availability of certified DBE and non-DBE firms, as well as certified ESB and non-ESB firms, were analyzed for construction and design projects contracted from October 1, 1996, through March 31, 2000.

2.1.1 Disadvantaged Business Enterprise (DBE) Classifications

For the purposes of this study, businesses classified as certified DBEs are firms at least 51 percent owned and controlled by members of one of five groups—African American, Hispanic American, Asian American, Native American, and Woman—and certified as such by the Colorado Department of Regulatory Agencies/Office of Certification (under contract with CDOT). CDOT also considers non-minority firms on a case by case basis. The non-minority firm must provide evidence of being socially and economically disadvantaged to become certified as a DBE.

We used the following criteria for DBE classification:

- **African American:** U.S. citizen or lawfully admitted permanent resident having an origin in any of the black racial groups of Africa.
- **Hispanic American:** U.S. citizen or lawfully admitted permanent resident from a Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish or Portuguese culture or origin regardless of race.
- **Asian American¹:** U.S. citizen or lawfully admitted permanent resident who originates from the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.
- **Native American¹:** U.S. citizen or lawfully admitted permanent resident who originates from any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition.
- **Woman:** U.S. citizen or lawfully admitted permanent resident that is a non-Hispanic white woman. This definition of “Woman” includes only white women. Minority women are included in their respective minority category.

2.1.2 Emerging Small Business (ESB) Enterprises Classifications

The ESB classification includes only those firms meeting CDOT’s criteria for an emerging small business regardless of race, ethnicity, or gender. However, in

¹ In the MGT Disparity Study of 1998, Asian and Native American firms were grouped together due to the usage of Census data. The use of vendor data for capacity analysis allows the disaggregation of these groups and allows more specific analysis to be performed.

determining DBE availability and utilization, ESBs that are owned by white males are not included. All other firms (regardless of race, ethnicity, or gender) were counted as non-ESB. ESBs were compared and contrasted with non-ESB firms.

2.1.3 Collection and Management of Data

To identify data sources and to determine the best data available at CDOT, MGT conducted interviews with key personnel in the offices of Staff Design, Project Development, Agreements, and the Center for Equal Opportunity. Upon conclusion of the interviews, a data assessment was conducted on a sample of CDOT's available data resources, and a data collection plan was designed. The data for design contracts/task orders and construction contracts at the prime contractor and subcontractor level were available in an electronic format. The data contained the following:

- Contract number;
- Contract name;
- Award amount;
- Year of award;
- Firm name (Prime) and number; and
- Firm name (Sub) and number.

In addition, MGT was supplied with lists of prequalified firms for both contractors and consultants. The prequalified data contained financial information and business service data. The Center for Equal Opportunity provided information regarding minority status, certification, gender, ethnicity, and business services.

The CDOT design consultant and construction contractor policies require firms to be prequalified in order to submit bids to perform work as a prime contractor or consultant. Thus, MGT considered only those firms prequalified with CDOT as firms ready, willing, and able to work as a prime consultant or contractor. MGT combined CDOT's contracts database, the DBE database, the prequalified database, and

membership directories of industry organizations to make up the master database of all firms willing and ready to work as subconsultants or subcontractors. MGT then compared this master firms database to the certified DBE list of contractors to identify the race, ethnicity, or gender of the primary owner(s).

MGT collected information on CDOT design and construction projects from CDOT's electronic consultant and contractor tracking system. Relevant data collected included the following:

- Prime Consultants/Contractors:
 - Name of firm
 - Address
 - Ethnicity
 - Type
 - ID number
 - DBE/Non-DBE
 - Contact person

- Contracts:
 - ID number
 - Description
 - Date awarded
 - Date rejected
 - Awarded amount
 - DBE goal percent
 - DBE goal met
 - Tentative completion date
 - Totals paid to date
 - Bid number

- Subconsultants/ Subcontractors:
 - Sub ID number
 - Bid number
 - DBE designation
 - Amount of subcontract
 - DBE work type

- Codes with descriptions.

Once the data were collected and input into an MGT database, the data were processed as follows:

- Identification of the county in which the firms operated by matching ZIP codes with a ZIP code database of counties. (MGT maintains a ZIP code database containing all United States ZIP codes.)
- Elimination of records not relevant to the study. Reasons procurements were eliminated from analysis include:
 - contracts awarded to nonprofits and government entities; and
 - contracts outside of the study period.

Firm financial information and business services data were collected from the CDOT prequalification and certification files. The information gathered was used to develop a database of financial information regarding the DBE and non-DBE firms suitable for design and construction contracting with CDOT.

Since complete data were not maintained on firm revenue, MGT conducted mail surveys of all consultants and contractors in the master firms database to capture annual revenues. In order to narrowly tailor the mail survey, different surveys were sent to specific groups. **Exhibit 2-1** shows the number of surveys mailed and returned. (A copy of each survey may be found in **Appendix B**). The data gathered via the surveys included information about owner ethnicity, gender, business service type, and revenue for the years of the study period. In addition, prime consultants and contractors were asked to submit listings of subcontractors and subconsultants for the time period.

**EXHIBIT 2-1
 COLORADO DEPARTMENT OF TRANSPORTATION
 DISPARITY STUDY UPDATE
 MAIL SURVEY RETURN RATE**

	# Sent	# Delivered	# Returned	Confidence Level
Total	1,771	1,613	356	99.00%

2.2 Data Methodology

The following sections detail the different types of analyses MGT used to examine the procurement data.

2.2.1 Step One Methodology

The analyses that are described in Step One includes:

- Market Area;
- Utilization;
- Availability;
- Capability;
- Disparity;
- Overutilization of DBEs by Work Codes; and,
- Weighting by Dollars Expended.

2.2.1.1 Market Area

A United States county was the geographical unit of measure selected for determining CDOT's market area. The use of counties as geographical units of analysis is based upon the following considerations:

- The courts have accepted counties as a standard geographical unit of analysis in conducting equal employment opportunity and disparity analyses; and
- County boundaries are externally determined and, hence, are free from any researcher bias that might result from any arbitrary determinations of boundaries of geographical units of analysis.

MGT utilized the principles of antitrust market analysis, which have been accepted in *Contractors Association of Eastern Pennsylvania, Inc. v. City of Philadelphia*², as appropriate for use in disparity studies. Courts have an accepted and settled process in such cases to assist any court "to recognize competition where, in fact, competition exists."³ In fact, the Tenth Circuit in *Concrete Works*, interpreting *Croson*, concluded: "The relevant area in which to measure discrimination...is the local construction market,

² *Contractors Association of Eastern Pennsylvania, Inc. v. City of Philadelphia*, 91 F.3d 586 (3d Cir. 1996)

³ *Brown Shoe Co. v. United States*, 370 U.S. 294, 326 (1962)

but that is not necessarily confined by jurisdictional boundaries.”⁴ The court further stated:

*It is important that the pertinent data closely relate to the jurisdictional area of the municipality whose program we scrutinize, but here Denver’s contracting activity insofar as construction work is concerned, is closely related to the Denver MSA.*⁵

The Tenth Circuit ruled that over 80 percent of Denver Department of Public Works construction and design contracts were awarded to firms located within the Denver Metropolitan Statistical Area (MSA). Therefore, the appropriate market area should be the Denver MSA, not the City and County of Denver alone.⁶ Accordingly, data from the Denver MSA was “adequately particularized for strict scrutiny purposes.”⁷ *Concrete Works* establishes that program eligibility within a relevant market is a question of market participation, not necessarily location.

The *overall market area* for our purposes in this study are those counties in which CDOT awards dollars for services. CDOT’s *relevant market area* was limited to those counties in which CDOT, over the study period, awarded at least 75 percent of its total contract dollars. To determine the *overall market area*, we used contracting data from October 1, 1996 to March 31, 2000. A database was created containing all firms who were awarded contracts during this period. A separate database was created, and analysis was performed, for design and construction contracts.

The first step in determining the relevant market areas was to sum the dollars awarded in each county for all study years. The counties were then listed in descending order according to dollars awarded in each county. Starting with the county having the

⁴ *Concrete Works of Colorado v. City and County of Denver*, 36 F.3d at 1520 (10th Cir. 1994) citing *City of Richmond v. J.A. Croson Company* 488 U.S. (1989).

⁵ *Id.*

⁶ *Id.*

⁷ *Id.*

largest dollar volume, succeeding counties were added to the relevant market area until at least 75 percent of the awarded dollars were included. As noted in Section 3.2 of Chapter 3, the State of Colorado is the relevant market area for both Design and Construction contracts.

The use of the 75 percent rule is generally accepted in antitrust cases. In another relevant case, the court accepted less than 100 percent of data when it was reasonable to assume that the missing data would not significantly change the results of the analyses.⁸ The data used in the determination of the relevant market area included:

- number of contracts;
- percent of total contracts;
- number of unique firms;
- percent of total firms;
- dollars spent or awarded; and
- percent of total dollars.

2.2.1.2 Utilization Methodology

Once the relevant market area was determined, all further analyses performed used only those contracts for consultants or prime contractors located in the relevant market area. An analysis of the combined prime contractor and subcontracting dollars was performed for both design and construction.

MGT used the following methodology to distinguish the total contract/task order dollars by DBE and ESB classifications for prime consultants, subconsultants, prime contractors, and subcontractors:

1. The dollars retained by the prime in each DBE/ESB and non-DBE/non-ESB classification were calculated using the formula:

Prime Contract Award \$ (DBE & non-DBE) or (ESB & non-ESB) –
Subcontractor/subconsultant \$ ((DBE & non-DBE) or (ESB & non-ESB))= Prime
Retained \$ ((DBE & non-DBE) or (ESB & non-ESB))

2. The dollars awarded for each group's subcontractors/subconsultant were combined with the dollars retained by each group's prime contractors/consultants:

⁸ *James C. Jones v. the New York City Human Resources Administration* 528 F. 2nd 696 (2nd Cir. 1976).

$$\text{Prime Retained \$} + \text{Subcontractor/subconsultant \$} = \text{Combined DBE /ESB \$ \& non-DBE/non-ESB \$}$$

An example of this calculation is seen when a non-DBE prime contractor hires three subcontractors (two DBEs and one non-DBE). The calculations are as follows:

- Prime (non-DBE) \$200 – Sub₁(DBE₁) \$20 – Sub₂(DBE₂) \$20 – Sub₃(non-DBE) \$20 = Prime Retained (DBE & non-DBE) \$140
- Prime retained (\$140) + Sub₁(DBE₁) \$20 + Sub₂(DBE₂) \$20 + Sub₃(non-DBE) \$20 = Combined \$160 non-DBE and \$40 DBE

The first calculation determines precisely how much of the contract the prime contractor received. The original \$200 in the example is the contract award amount. Each of the amounts received by the subcontractors is then subtracted from the contract award amount to determine the amount the prime contractor retained. The amount retained by prime contractor is then added to the appropriate DBE/non-DBE category. In the example, the prime contractor is a non-DBE; therefore, the \$140 the prime contractor retained from the contract is added to the \$20 of the only non-DBE subcontractor and yields \$160 for non-DBE utilization. Since the prime contractor is not a DBE, the amounts given to each of the DBE subcontractors is summed and yields \$40 for the DBE utilization. Using the amount awarded to prime contractors within the relevant market area, MGT calculated the percentage of dollars for each DBE classification per fiscal year and then for the entire study period.

MGT performed the same analysis as previously presented, based on the percentage of dollars for DBE and non-DBE firms delineated, by prequalified workcodes. CDOT has established occupational groupings for prequalified firms. The workcode designations for design and construction are shown in **Exhibit 2-2**.

**EXHIBIT 2-2
COLORADO DEPARTMENT OF TRANSPORTATION
WORK CODE DESIGNATIONS**

WORK CODE	DESCRIPTION
Design:	
25	Acoustical Engineering
26	Architecture
27	Bridge Design
28	Bridge Inspection
29	Civil Engineering
30	Electrical Engineering
31	Environmental Engineering
32	Geological Engineering
33	Geotechnical Engineering
34	Highway and Street Design
35	Hydraulics
36	Landscape Architecture
37	Management (contract admin)
38	Management (construction)
39	Mechanical Engineering
40	Sanitary Engineering
41	Soils Engineering
42	Structural Engineering
43	Surveying
44	Traffic Engineering
45	Transportation Engineering
46	Tunneling
47	Materials Testing
48	Preliminary Studies
49	Right of Way services
50.	Irrigation Design
51	Other
Construction	
1	General Construction
2	Grading (general)
3	Light Grading
4	Aggregates
5	Paving (general)
6	Bituminous Concrete
7	Seal Coat
8	Portland Cement Concrete
9	Structures
10	Small Bridges
11	Minor Structures
12	Curb, Gutter, Flatwork
13	Fencing
14	Guard Rail
15	Landscaping
16	Pavement Marking
17	Construction traffic control
18	Pavement Repair
19	Structure Repair
20	Electrical, Signals
21	Building Construction
22	Sprinkler System
24	Other

2.2.1.3 Availability Methodology and Analysis

The availability of DBEs is calculated as the percentage of all firms in the relevant market area that are DBEs. These figures are then used for comparison with utilization to determine disparity. Determining availability of DBEs is essential for setting DBE goals.

Two different sets of data are used to determine the percentage of DBEs ready and willing to provide design and construction services:

- the number of available prime contractors and prime consultants based on CDOT's list of prequalified contractors and consultants; and,
- the number of subcontractors and subconsultants available based on subcontractors and subconsultants who worked on CDOT projects, CDOT'S DBE and ESB directories, and firms listed in industry organizations' directories.

Names of available subcontractors and subconsultants were also added to the availability list if a prime listed the name in response to a mail survey conducted by MGT requesting the names of subcontractors and subconsultants used on projects

2.2.1.4 Capability Methodology and Analysis

In *Croson*, Justice O'Connor stated that firms must be ready, willing, and able to do work in order to be considered available. Further, the Eleventh Circuit, in reviewing *Concrete Works*, reasoned:

*[Plaintiff] had identified a legitimate factual dispute about the accuracy of Denver's data and questioned whether Denver's reliance on the percentage of MBEs and WBEs available in the market place overstates "the ability of MBEs or WBEs to conduct business relative to the industry as a whole because M/WBEs tend to be smaller and less experienced than non minority-owned firms." Therefore, a disparity index calculated on the basis of the absolute number of MBEs in the local market may show greater underutilization than data that takes into consideration the size of MBEs and WBEs.*⁹

⁹ *Engineering Contractors Association of South Florida v. Metropolitan Dade County*, 122 F.3d 895 (11th Cir. 1997), citing *Concrete Works of Colorado v. City & County of Denver*, 36 F.3d 1513 at 1522 (10th Cir. 1994)

Therefore, according to *Concrete Works*, an analysis of a firm's willingness and ability to provide services must include a determination of whether the firm is qualified. Mere willingness is not sufficient; it must work in concert with ability and qualifications.

Past analyses of availability have not taken into consideration a firm's capability to perform work. Prior analyses have dealt only with the firm's existence and the fact that it received revenues in the relative line of business. In response to Justice O'Connor's plurality opinion in *Croson* and recent literature, MGT has designed a methodology to capture the capability portion of the analysis so that the number of firms reported to be available to do business with the CDOT reflects the capability of the firm to perform the work.

The capability analysis for this study summarizes the experiences of firms previously prequalified as prime contractors with CDOT. Firms in the MGT Master Vendor Database, which includes prequalified construction contractors and consultants, certified DBEs, and subcontractors and subconsultants, were then analyzed to determine their capability of doing business with CDOT in the future.

Defining Capability

Although the disparity critics have advocated the inclusion of capability in estimating availability there is not a consensus on how capability should be measured. MGT reviewed the literature on capability and found that there is a basic trend towards measuring capability through the use of firm revenue. Revenue is a good indicator of capability because revenue measures past success and past success is a good predictor of future success. Therefore, it is assumed that firms with greater revenue should gain a larger share of the public sector market. Consequently, it is presumed that larger firms possess the ability to obtain and complete more and larger contracts and

subcontracts since they possess the resource base necessary to bid, win, and complete the work.

Admittedly, there are other factors to predict success. Although it is true that these factors (such as niche marketing, internal management practices, workload, and political connections) may be used as predictors of success, they are difficult to measure. Generally accepted measures have not been defined for these factors, and information is not regularly tracked by public sector or private sector entities to assist in the measurement. In light of the difficulties associated with measuring these factors, it is our considered opinion that firm revenue provides the closest approximation of firm capability; therefore, it is used in this analysis.

MGT determined that the characteristics of firms that experienced past success provided a solid basis for determining if a firm is capable of doing related work. In other words, firms with similar revenue are considered equally capable. Therefore, if a firm has been selected to work for CDOT in the past, it is a capable firm, and it is equally safe to assume that firms with similar revenue characteristics that have not been previously selected to work for CDOT are also capable of performing the same or similar work.

Relationship Between Capability and Success

Before presenting the results of the capability analysis, the relationship between capability and success needs to be explained. Critics argue that firms with relatively low revenue should not be considered to be available for inclusion in disparity ratios because they are not necessarily “capable” of completing large contracts. An extension of this argument is that firms with high revenue should win more or larger contracts. This would suggest that a positive relationship exists between capability (as measured by firm

revenue) and contract dollars won. MGT used regression analysis to test this hypothesis using the data collected from CDOT.

Regression analysis is utilized for the purpose of prediction. For the case of two variables, a model is developed that uses the independent variable X to obtain a better prediction of the other variable, the dependent variable Y .¹⁰

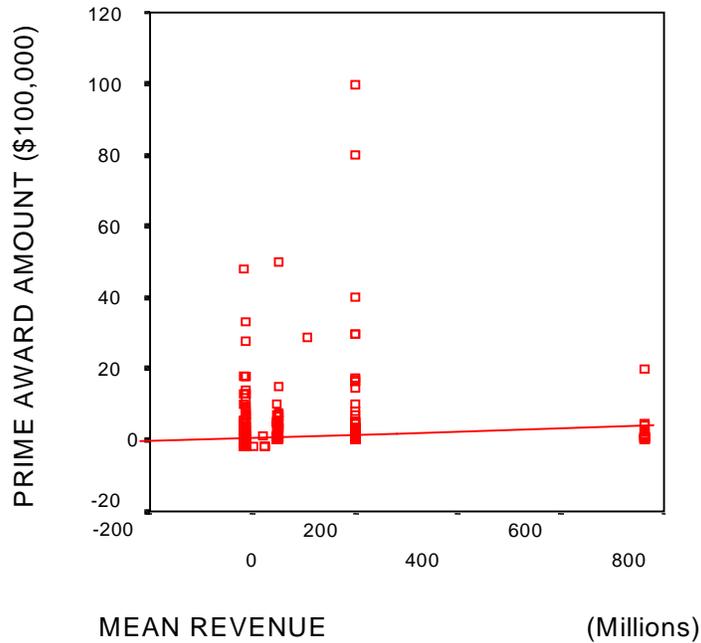
For this study, the regression analysis used firm revenue as the independent variable X to predict the level of awarded contracts (the dependent variable, or Y). The assumption, as mentioned earlier, is that higher levels of contract awards indicate greater degrees of capability and success.

Design Revenue and Contract/Task Order Analysis

Exhibit 2-3 shows the relationship between firm revenue and the contract/task order amount awarded to a firm. The graph depicts this relationship and how well a linear regression line fits the graph. As seen in the graph, the relationship is not a linear relationship. In other words, having more firm revenue does not necessarily mean or even indicate that a firm will be awarded the larger contracts/task orders. The largest contract/task order won (\$10 million) was by a firm with \$200 million mean revenue. The firm with the largest mean revenue (\$764 million) won contracts/task orders ranging from \$19,070 to \$2,000,000.

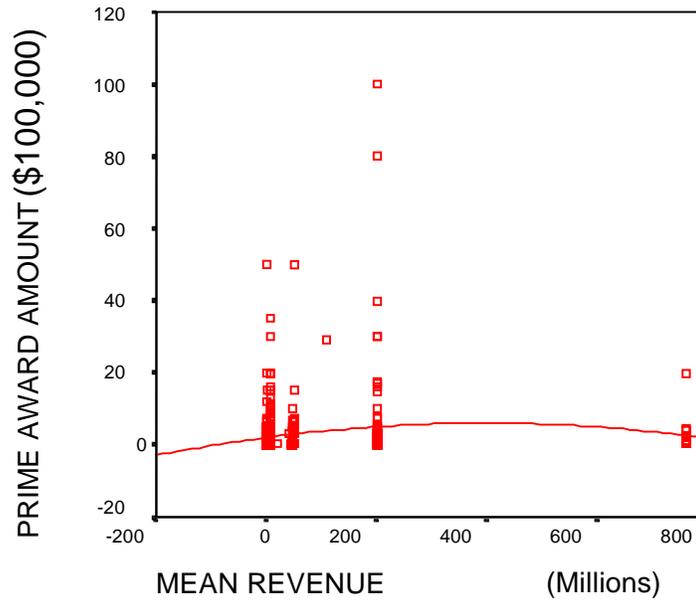
¹⁰ Berenson and Levine, Basic Business Statistics – Concepts and Applications (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1979) p. 462.

**EXHIBIT 2-3
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN CONTRACT/TASK ORDER AWARD AMOUNT BY MEAN FIRM REVENUE
LINEAR REGRESSION LINE APPLIED**



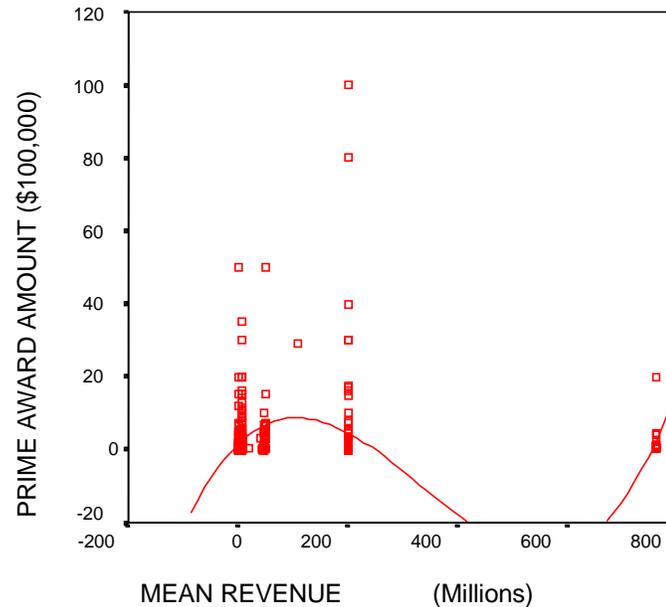
The following graph illustrates the same relationship, but this time a quadratic regression line is fit to the graph. As can be seen in the graph, the quadratic line is not an adequate fit to the graph either.

EXHIBIT 2-3 (Continued)
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN CONTRACT/TASK ORDER AWARD AMOUNT BY MEAN FIRM REVENUE
QUADRATIC REGRESSION APPLIED



Finally, we apply a cubic regression line to the graph. This type of regression also is not an adequate fit. This relationship is shown below.

EXHIBIT 2-3 (Continued)
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN CONTRACT/TASK ORDER AWARD AMOUNT BY MEAN FIRM REVENUE
CUBIC REGRESSION APPLIED



The purpose of fitting these regression lines to the graph is to determine if different types of models would adequately explain the relationship between mean revenue and the contract dollars awarded to a firm. However, as shown above, none of the regression lines provides an adequate fit to the graph.

Another way to represent the linear regression model is through an equation. The following equation was used to determine the fit of the model:

$$\text{Contract/Task Order Award Amount} = \alpha + \beta \text{Mean Firm Revenue}$$

The results yielded an r-squared of .0066 for the entire model. This means that 0.6 percent of the variation present in contract success can be explained by this model. The equation is:

Contract/Task Award Amount = 763671.2 + 0.002956*Mean Firm Revenue

This model does not adequately represent this relationship given its low explanatory power.

A descriptive analysis of contract dollars, mean contract dollars, and total contract dollars for design yields the results shown in **Exhibit 2-4**. The analysis reveals that the mean design contract/task order was \$274,433 for the firms with available revenue information, while the mean total contract/task order awarded to design firms for the 1996-2000 period was \$329,074.

**EXHIBIT 2-4
COLORADO DEPARTMENT OF TRANSPORTATION
REPRESENTATIVE SAMPLE OF DESIGN CONTRACTS/TASK ORDERS
BY RANGE, MEAN, AND TOTAL PRIME CONTRACT/TASK ORDER DOLLARS ¹**

CONTRACTS	MINIMUM	MAXIMUM	MEAN	SUM
Contract/Task order Dollars ¹	\$1,023	\$10,000,000	\$274,433	\$145,724,162
Total Contract/Task order Dollars ²	\$1,023	\$20,000,000	\$329,074	\$577,526,162

¹ This table is representative of the contracts for those firms from which we were able to collect revenue data.

² Total contract/task order dollars represents the total contract/task order from 1996-2000 with the market area for design jobs.

Exhibit 2-5 captures the minimum, maximum, mean, and sum of actual firm revenue. For the firms that conducted business with CDOT as prime consultants in 1996-2000, mean revenue ranged between a minimum of \$28,170 and a maximum of \$764,200,000.

**EXHIBIT 2-5
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION CONTRACTOR'S FIRM REVENUE
 BY RANGE, MEAN, AND TOTAL ACTUAL FIRM REVENUE**

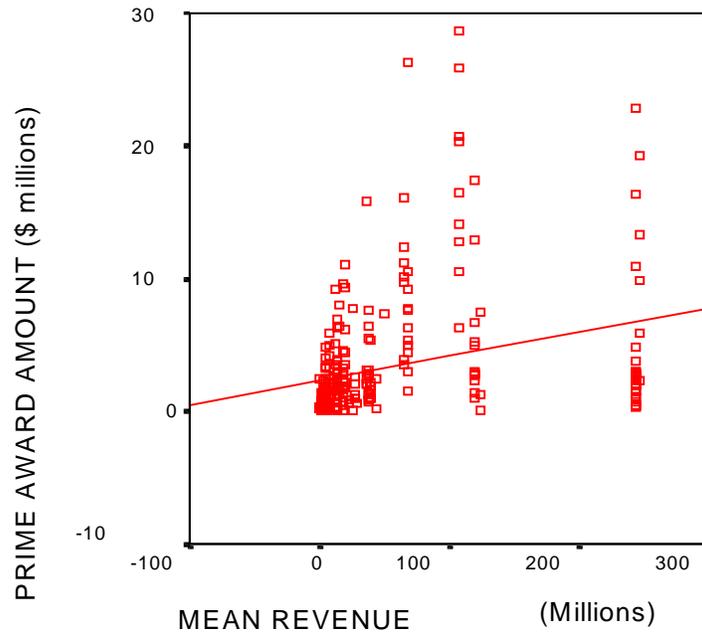
REVENUE	MINIMUM	MAXIMUM	MEAN	SUM
1996	\$132,422.00	\$200,000,000.00	\$58,519,223.11	\$2,165,211,255.00
1997	\$142,683.00	\$764,200,000.00	\$68,562,756.36	\$5,690,708,778.00
1998	\$142,683.00	\$764,200,000.00	\$77,957,774.56	\$10,836,130,664.00
1999	\$142,672.00	\$764,200,000.00	\$57,479,809.43	\$10,001,486,840.00
2000	\$28,170.00	\$764,200,000.00	\$61,151,234.18	\$5,809,367,247.00
Mean Firm Revenue ¹	\$28,170.00	\$764,200,000.00	\$382,114,085	\$65,346,410.58

¹The mean firm revenue accounts for the mean of the revenue figures for each time period reported by a firm. In some cases, there is only a single revenue figure while other calculations take into account all five years.

Construction Revenue and Contract Analysis

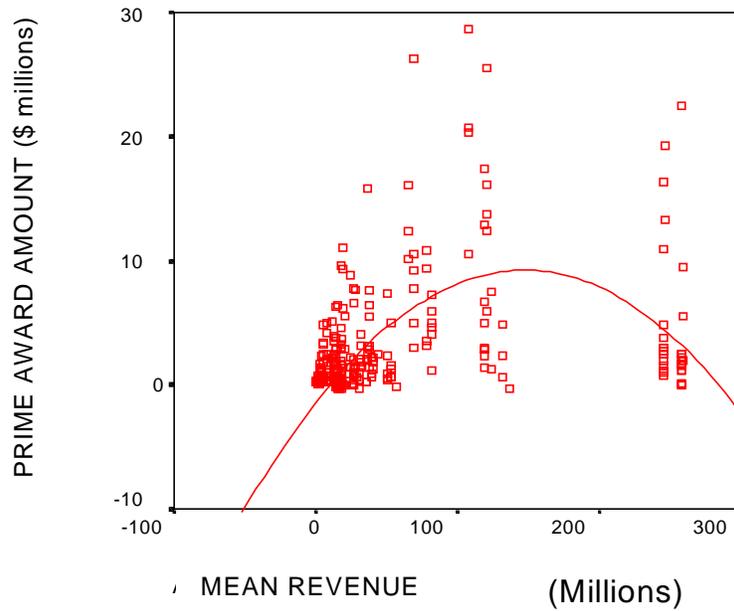
Exhibit 2-6 shows the relationship between firm revenue and the contract amount awarded to a firm. The graph below depicts this relationship and how well a linear regression line fits the graph. As seen in the graph, the relationship is not a linear relationship. In other words, having more firm revenue does not necessarily mean or even indicate that a firm will win the larger contracts. In fact, the largest contract won (\$28,612,187) was by a firm with mean revenues of \$107 million which, while significant, is by no means the greatest. The firm with the largest mean revenue (\$246,249,997.75) won \$19,295,000.00 as its largest contract.

**EXHIBIT 2-6
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION CONTRACT AWARD AMOUNT BY MEAN FIRM REVENUE
LINEAR REGRESSION LINE APPLIED**



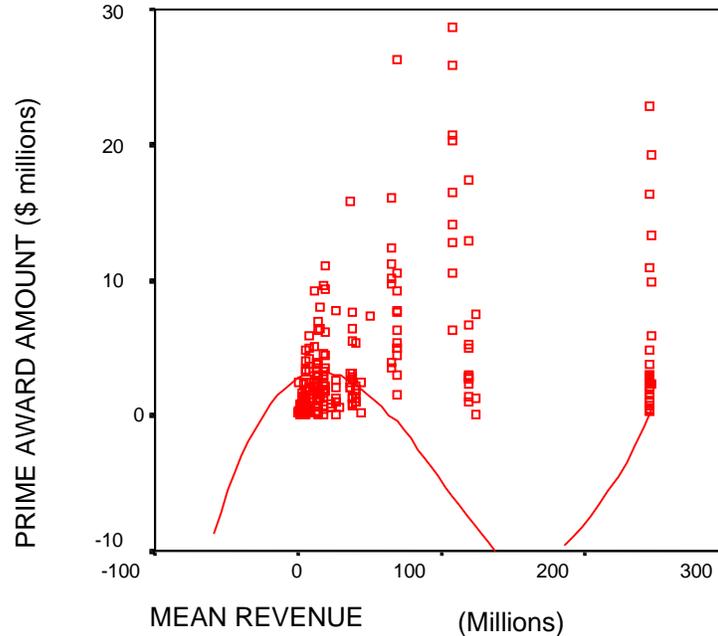
The following graph illustrates the same relationship, but this time a quadratic regression line is fit to the graph. As can be seen in the graph, the quadratic line is not an adequate fit to the graph.

EXHIBIT 2-6 (Continued)
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION CONTRACT AWARD AMOUNT BY MEAN FIRM REVENUE
QUADRATIC REGRESSION APPLIED



Finally, we apply a cubic regression line to the graph. This type of regression also is not an adequate fit.

EXHIBIT 2-6 (Continued)
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION CONTRACT AWARD AMOUNT BY MEAN FIRM REVENUE
CUBIC REGRESSION APPLIED



The purpose of fitting these regression lines to the graph is to determine if a different type of regression would adequately explain the relationship between mean revenue and the contract dollars awarded to a firm. However, as explained above, none of the regression lines provides an adequate fit to the graph.

The following equation was used to determine the fit of the model:

$$\text{Contract Award Amount} = \alpha + \beta \text{Mean Firm Revenue}$$

The results yielded an r-squared of .087 for the entire model. This means that 8.7 percent of the variation present in contract success can be explained by this model. The equation is:

$$\text{Contract Award Amount} = 763671.2 + 0.002956 * \text{Mean Firm Revenue}$$

This model does not adequately represent this relationship given its low explanatory power.

A descriptive analysis of contract dollars, mean contract dollars, and total contract dollars for construction yields the results shown in **Exhibit 2-7**. The analysis reveals that the mean construction contract was \$3,357,325 for those firms where revenue information was available, compared to \$3,095,910 for all contract dollars.

**EXHIBIT 2-7
COLORADO DEPARTMENT OF TRANSPORTATION
REPRESENTATIVE SAMPLE OF CONSTRUCTION CONTRACTS
BY RANGE, MEAN, AND TOTAL PRIME CONTRACT DOLLARS ¹**

CONTRACTS	MINIMUM	MAXIMUM	MEAN	SUM
Contract Dollars ¹	\$52,992	\$28,612,187	\$3,357,325	\$896,405,916
Total Contract Dollars ²	\$28,475	\$33,589,615	\$3,095,910	\$1,331,241,399

¹ This table is representative of the contracts for those firms from which we were able to collect revenue data.

² Total contract dollars represents total contract awards within the relevant market for construction contracts over the time period.

Exhibit 2-8 captures the minimum, maximum, mean, and sum of actual firm revenue. For the firms that conducted business with CDOT as prime contractors in 1996-2000, mean revenue ranged between a minimum of \$62,917 and a maximum of \$246,249,997.

**EXHIBIT 2-8
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION CONTRACTOR'S FIRM REVENUE
BY RANGE, MEAN, AND TOTAL ACTUAL FIRM REVENUE**

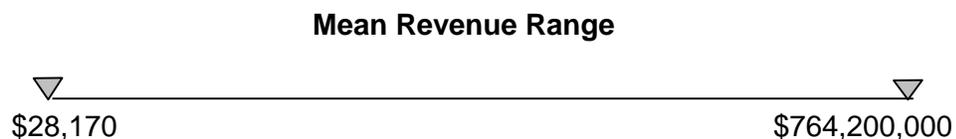
REVENUE	MINIMUM	MAXIMUM	MEAN	SUM
1996	\$62,917.50	\$246,249,997.75	\$90,214,164.80	\$2,074,925,790.50
1997	\$778,763.04	\$246,249,997.75	\$56,680,541.09	\$4,761,165,451.19
1998	\$62,917.50	\$246,249,997.75	\$56,688,143.45	\$4,421,675,189.12
1999	\$265,609.00	\$244,407,139.00	\$43,154,372.94	\$2,675,571,122.15
2000	\$100,000.00	\$244,407,139.00	\$45,960,775.10	\$919,215,502.00
Mean Firm Revenue ¹	\$62,917.50	\$246,249,997.75	\$123,156,457.63	\$55,836,665.62

¹ The mean firm revenue accounts for the mean of the revenue figures for each time period reported by a firm. In some cases, there is only a single revenue figure, while other calculations take into account all five years.

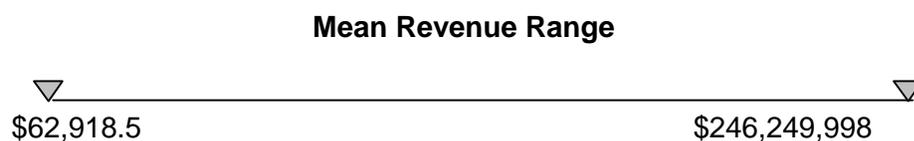
The Impact of Capability on Availability

In order to determine the impact of capability (measured as firm revenue) on availability, ranges were established using the minimum and maximum firm revenues. The ranges shown below graphically represent firm capability and can be used to determine if a firm is capable of doing business with CDOT. While minimum and maximum values are given, obviously a firm that exceeds the maximum value is still considered capable of performing work for CDOT. Since the data includes only those firms that have actually conducted business with CDOT, it is clear that these firms were ready, willing, and able to perform work at the time the contract was awarded.

Design Capability:



Construction Capability:



Capability Adjustments

One of the primary reasons for this report is to adjust the original availability data set of ready, willing and able firms based on multiple factors specific to the local market area for CDOT. In order to adjust calculations, the samples collected by the surveys were examined. The samples were analyzed to determine if they met a 95 percent confidence level and a three percent error rate. Each of the samples met this criteria,

meaning that we can be 95 percent confident that the sample generated is representative of the population.

To determine the adjustment necessary for the availability, we determined how many firms in the sample would be excluded once the overall range was applied. Only one firm was excluded from the non-DBE prequalified firms sample and one firm from the non-DBE nonprequalified firms sample when the overall range was applied. The next step in the analysis is to apply the percentage change that occurred in the sample to the original availability. The formulas for this analysis are:

$$1.0 - (\text{Sample}/\text{Sample After Capability}) = \text{Percent Change}$$

$$\text{Original Available} - (\text{Original Available} * \text{Percent Change}) = \text{Adjusted Availability}$$

2.2.1.5 Disparity Methodology

The methodology for determining the presence or absence of disparity (disparity indices) for design and construction services provided by DBEs is explained in this section. Then the statistical results obtained in the utilization and availability analyses are compared to produce a disparity index for each service area.

The underlying assumption of the disparity index is that the proportion of dollars received by DBE and non-DBE groups should approximate the group's proportion of available firms in the relevant market area. To determine if DBE and non-DBE groups were underutilized or overutilized (disparity does or does not exist), MGT compared the utilization of each group with its availability.

Disparity Index

The disparity index has four major thresholds. If the disparity index is 0.00, it indicates that there is no utilization of the group. If the disparity index is 80 or less, it indicates significant underutilization of a group. If the disparity index is 100, it indicates equality between utilization and availability. A group is considered overutilized if the disparity index is greater than 100.

In the context of employment discrimination, a disparity ratio below 80 indicates a substantial level of disparity demonstrating adverse or disparate impact, based on the Equal Employment Opportunity Commission's (EEOC) "80 percent rule" in *Uniform Guidelines on Employee Selection Procedures*.. The Supreme Court accepted the use of the 80 percent rule in *Connecticut v. Teal*, 457 U.S. 440 (1982). The concept of a disparity ratio has also been cited approvingly in the federal courts.¹¹ Thus, MGT's designation of disparity is founded upon these decisions.

A variety of indices are available to calculate the disparity index. However, MGT uses the following formula because it is easily calculable, readily interpreted, and universally compared:

$$\text{Disparity Index} = \frac{\%Ud_1p_1}{\%Ad_1p_1} \times 100$$

Where: Ad_1p_1 = availability of DBE₁ for procurement₁
 Ud_1p_1 = utilization of DBE₁ for procurement₁

Disparity indices were prepared for DBE and non-DBE firms by race, ethnicity or gender groups for the study period. Indices were also prepared for prime contractors/consultants and prime contractors and subcontractors combined. Work codes that showed disparity indices of greater than 100 (indicating overutilization) were

¹¹ *Concrete Works of Colorado, Inc. v. City and County of Denver*, 36 F.3d 1513, 1523 n.10 (10th Cir. 1994) (recognizing disparity index to demonstrate underutilization); *Contractors Ass'n of Eastern Pennsylvania, Inc. v. City of Philadelphia*, 6 F.3d 990, 1005 (3rd Cir. 1993) (relying on disparity indices); *Cone Corp. v. Hillsborough County*, 908 F.2d 908, 915-16 (11th Cir. 1990) (employing similar statistical analyses).

examined. The number of DBE firms that were performing work within these overutilized work code categories were removed from the overall availability for DBEs, since these firms were not underutilized during the study period.

2.2.1.6 Weighting by Dollars Expended

As the March 6, 2001, guidance document on goal-setting from the United States Department of Transportation Office of Small Disadvantaged Business Utilization (OSDBU) suggested, we have weighted each of the work codes in which DBEs were underutilized according to the dollars expended in each work code. Therefore, the availability of all firms by work code was multiplied by the relative percentage of dollars expended by CDOT to determine the weighted distributions.

2.2.2 Step Two Methodology

The analyses that are performed in Step Two concern the adjustment of the available ready, willing and able firms. The following adjustments were made to the base availability estimates to narrowly tailor the aspirational goals for CDOT:

- Median Past Participation; and,
- Impact of the Southeast Corridor Project.

Finally, the methodology for goal setting is discussed.

Median Past Participation

The guidance from the OSDBU referenced above states, “If you feel that an adjustment based on past participation is warranted, and you cannot determine any more precise way to make the adjustment, you may average the figure in Step One with a figure which represents your past participation.” It is the opinion of the CDOT construction and design staff that the future CDOT contracting opportunities will be similar in scope to contracts issued over the past four and one half years.

For this study, we calculated an adjustment factor to be applied to the availability of DBE firms. This adjustment was based on the average of the Step One availability of DBE firms by business category and the median utilization of those firms by business category. The resulting percentage yielded the DBE availability based on median past participation.

The following example depicts the calculation:

Step One Availability	DBE Past Participation
	Work Code 1 2%
	Work Code 2 3%
	Work Code 3 5%
	Work Code 4 6%
	Work Code 5 8%
Base: 20%	Median: 5%
Average:	12.5%

Impact of the Southeast Corridor Project

The final factor that was taken into consideration in adjusting the availability estimates of ready, willing and able DBEs to participate in the CDOT contracting program was the impact of the Southeast Corridor Project. The Southeast Corridor Project is a \$1.6 billion dollar project jointly funded by the Regional Transportation District (RTD) and CDOT. The project will span over seven years and has an overall DBE goal of 15.83 percent, of which CDOT's goal is 16.6 percent.

MGT reviewed the work codes included in the CDOT DBE goal for 2001 in the construction and design phases of the Southeast Corridor Project. The review process factored in the exclusion of DBEs in overutilized areas and weighted the remaining work codes based on the total DBE availability. The weighting factor of .1308 for construction contracts resulted in a negative adjustment of 1.25 percent from the available DBEs to work on CDOT construction projects for 2001. The weighting factor of .1053 for design

contracts/task orders resulted in negative adjustments of 1.99 percent from the available DBEs to work on CDOT design projects for 2001.

Goal Setting

Once the final adjusted availability was established in Step Two, it was appropriate to determine the race- and gender-neutral and conscious goals. The formulas for race- and gender-conscious goals and race- and gender-neutral goals, respectively, are as follows:

$$\begin{aligned} \text{Race Neutral Goal} &= \%Adbe - (\%Udbe + \%Esb) \\ \text{Race Preference Goal} &= \%Adbe - \%R/N \end{aligned}$$

Where: Adbe = final adjusted available DBE firms
Udbe¹² = underutilized DBE firms
Esb = DBE emerging small businesses
R/N = race neutral

There are two conditions on these formulas. First, if the percentage of contract dollars awarded to DBE prime contractors and subcontractors combined is less than the percentage of available DBE firms, then the race- and gender-neutral goal is equal to the percentage of contract dollars awarded to DBE prime contractors. The race neutral goal is equal to the DBE contract dollars because all prime construction contracts are awarded on a low bid basis making DBE participation, in that instance, race and gender neutral. As stated earlier, this portion captures any amount going above and beyond the race- and gender-conscious goal. If the availability is larger than the DBE prime contractor and subcontractor utilization, there is no possibility of going above and beyond the race- and gender-conscious goals.

Second, if the race- and gender-neutral goal formula yields an amount greater than the availability of DBE firms, then the race- and gender-neutral goal is equal to the

¹² Design UDBE excludes Asian and Native American firms from October 1999 through March 31, 2000. Construction UDBE excludes Women and Hispanic American firms from October 1998 through March 31, 2000.

availability of DBE firms. The reason for this is that it is not logical to assign a goal greater than the availability of the DBE firms.

3.0 DATA ANALYSES

3.0 DATA ANALYSES

This chapter presents the data analyses of design and construction contracting activity of the Colorado Department of Transportation (CDOT) occurring between October 1, 1996 through March 31, 2000. To develop accurate goals for CDOT's federal contracting for 2001, a series of analyses occurred in two steps as required by the United States Department of Transportation. Included in this chapter are the results of the Step One analyses (relevant market areas, the utilization of DBE¹ and non-DBE firms, availability, capability, disparity, and weighting by percent of dollars expended) and Step Two analyses (overutilized work codes, median past participation and the Southeast Corridor project).

The data analyses consisted of an examination of CDOT's consultant design contracts/task orders and a separate review of the construction contracts.

3.1 Data Analyses

To determine the base availability estimates of ready, willing and able firms and contractors, Step One includes:

- determining the relevant market area;
- analyzing the utilization of certified DBE prime consultants and subconsultants and contractors and subcontractors by work code;
- calculating the number of available DBE prime consultants and subconsultants and prime contractors and subcontractors by work code;
- calculating the capability of available DBE prime consultants and subconsultants and prime contractors and subcontractors by work code;
- analyzing disparity based on utilization; and

¹ Disadvantaged Business Enterprise

- weighting the availability by percent of dollars expended.

In Step Two, adjustments were made to the base availability based on:

- median past participation; and
- estimated impact of the Southeast Corridor project.

3.2 Step One Analyses

The Step One analysis is presented for design firms followed by the analysis for construction firms.

3.2.1 Market Area

For design consultant contracts/task orders, the State of Colorado was determined to be the relevant market area, as shown in **Exhibit 3-1**. Over the study period, over \$602 million was spent by CDOT on design contracts/task orders. Over 95 percent of all dollars were spent with design firms that were located in the State of Colorado. Within the relevant market area, 80 different consultants were awarded 1,768 contracts/task orders totaling approximately \$578 million.

**EXHIBIT 3-1
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES
MARKET AREA ANALYSIS
OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

County, State	# of Task Orders	% of Task Orders	# of Consultants	% of Consultants	Dollars	% of Dollars	Cum% ¹
STATE OF COLORADO	1,768	96.82%	80	86.02%	\$577,526,159.53	95.87%	95.87%
RAMSEY, MN	47	2.57%	5	5.38%	\$21,964,687.19	3.65%	99.52%
LEON, FL	5	0.27%	4	4.30%	\$2,563,253.73	0.43%	99.94%
PHILADELPHIA, PA	5	0.27%	3	3.23%	\$97,865.00	0.02%	99.96%
OSCEOLA, FL	1	0.05%	1	1.08%	\$234,280.00	0.04%	100.00%
Total	1,826	100.00%	93	100.00%	\$602,386,245.45	100.00%	

Source: CDOT electronic Consultant Tracking System from October 1, 1996, through March 31, 2000.

¹ Cumulative total of percent of dollars in market area.

² Counties above the line are included in the relevant market area.

The State of Colorado was also determined to be the relevant market area for construction services. CDOT spent approximately \$1.5 billion on construction services, which is shown in **Exhibit 3-2** by county and the dollar value of the construction projects.

The average construction contract during the study period was approximately \$3.1 million for contracts within the relevant market area, and \$3.8 million for contracts outside of the relevant market area. CDOT utilized 123 firms on 472 contracts.

**EXHIBIT 3-2
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES
MARKET AREA ANALYSIS
OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

County, St	# of Contracts	% of Contracts	# of Firms	% of Firms	Dollars	% of Dollars	Cum% ¹
STATE OF COLORADO	430	91.10%	112	91.06%	\$1,331,241,399.24	89.33%	89.33%
SAUK, WI	18	3.81%	1	0.81%	\$99,782,326.23	6.70%	96.03%
SPOKANE, WA	1	0.21%	1	0.81%	\$24,907,434.72	1.67%	97.70%
RACINE, WI	1	0.21%	1	0.81%	\$13,028,290.06	0.87%	98.57%
YELLOWSTONE, MT	4	0.85%	1	0.81%	\$4,164,646.37	0.28%	98.85%
LARAMIE, WY	2	0.42%	1	0.81%	\$3,896,743.15	0.26%	99.11%
MARICOPA, AZ	5	1.06%	1	0.81%	\$3,481,243.00	0.23%	99.35%
BERNALILLO, NM	2	0.42%	1	0.81%	\$3,104,945.95	0.21%	99.56%
DUCHESNE, UT	2	0.42%	1	0.81%	\$2,989,075.72	0.20%	99.76%
SANTA CRUZ, CA	2	0.42%	1	0.81%	\$1,703,703.00	0.11%	99.87%
CUMBERLAND, PA	4	0.85%	1	0.81%	\$1,183,060.96	0.08%	99.95%
ORANGE, CA	1	0.21%	1	0.81%	\$739,341.60	0.05%	100.00%
Total	472	100.00%	123	100.00%	\$1,490,222,210.00	100.00%	

Source: CDOT electronic Contractor Tracking System from October 1, 1996, through March 31, 2000.

¹ Cumulative total of percent of dollars in market area.

² Counties above the line are included in the relevant market area.

Within the relevant market area, as **Exhibit 3-2** illustrates, approximately 89 percent of the dollars spent on construction projects went to 112 firms in the form of 430 contracts totaling approximately \$1.3 billion.

3.2.2 Utilization of Certified DBE Prime Consultants and Subconsultants and Prime Contractors and Subcontractors by Work Code

For the following analysis, MGT calculated the dollar amount and percentage of dollars awarded to certified DBE prime contractors and subcontractors within the relevant market area by the type of work performed on contracts. Only those dollars of certified DBE subconsultants/subcontractors of prime consultants/contractors in the relevant market area were included in this analysis.

The analysis of design prequalified work codes is shown in **Exhibit 3-3**. The work codes with the greater amounts of DBE participation are geological engineering, geotechnical engineering and materials testing as a percent of total dollars expended in that work code. The work codes with the higher levels of DBE contract dollars are highway and street design and materials testing, with around eight million dollars each.

**EXHIBIT 3-3
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN SERVICES - UTILIZATION ANALYSIS
 PRIME CONSULTANTS AND SUBCONSULTANTS
 DOLLARS AND PERCENTAGE OF OVERALL DOLLARS
 BY PREQUALIFIED WORK CODE
 OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

PREQUALIFIED WORK CODE	DBE		NON-DBE		TOTAL	% OF TOTAL
	\$	%	\$	%	\$	DOLLARS
ACOUSTICAL ENGINEERING	\$108,658.00	2.88%	\$3,661,684.42	97.12%	\$3,770,342.42	0.65%
ARCHITECTURE	\$4,503.44	1.53%	\$289,329.86	98.47%	\$293,833.30	0.05%
BRIDGE DESIGN	\$814,804.70	5.28%	\$14,609,120.55	94.72%	\$15,423,925.25	2.67%
BRIDGE INSPECTION	\$74,651.00	0.97%	\$7,598,241.97	99.03%	\$7,672,892.97	1.33%
CIVIL ENGINEERING	\$1,632,434.18	15.21%	\$9,098,835.90	84.79%	\$10,731,270.08	1.86%
ELECTRICAL ENGINEERING	\$51,712.00	0.23%	\$22,062,021.04	99.77%	\$22,113,733.04	3.83%
ENVIRONMENTAL ENGINEERING	\$1,856,982.82	3.23%	\$55,718,774.63	96.77%	\$57,575,757.45	9.97%
GEOLOGICAL ENGINEERING	\$138,439.14	84.50%	\$25,400.00	15.50%	\$163,839.14	0.03%
GEOTECHNICAL ENGINEERING	\$2,244,971.20	28.18%	\$5,722,622.35	71.82%	\$7,967,593.55	1.38%
HIGHWAY AND STREET DESIGN	\$7,774,060.86	3.79%	\$197,486,877.10	96.21%	\$205,260,937.96	35.54%
HYDRAULICS	\$81,996.09	2.13%	\$3,766,532.96	97.87%	\$3,848,529.05	0.67%
LANDSCAPE ARCHITECTURE	\$2,455.66	1.59%	\$151,675.80	98.41%	\$154,131.46	0.03%
MANAGEMENT (CONTRACT ADMIN)	\$1,156,686.33	1.72%	\$65,917,820.75	98.28%	\$67,074,507.08	11.61%
MANAGEMENT (CONSTRUCTION)	\$1,732,354.86	4.87%	\$33,809,649.72	95.13%	\$35,542,004.58	6.15%
MECHANICAL ENGINEERING	\$7,840.00	2.49%	\$307,041.67	97.51%	\$314,881.67	0.05%
SANITARY ENGINEERING	\$0.00	0.00%	\$381,151.59	100.00%	\$381,151.59	0.07%
SOILS ENGINEERING	\$203,319.09	4.37%	\$4,453,123.37	95.63%	\$4,656,442.46	0.81%
STRUCTURAL ENGINEERING	\$69,338.00	1.84%	\$3,706,665.28	98.16%	\$3,776,003.28	0.65%
SURVEYING	\$786,863.03	3.69%	\$20,529,571.83	96.31%	\$21,316,434.86	3.69%
TRAFFIC ENGINEER	\$30,573.38	0.50%	\$6,142,377.22	99.50%	\$6,172,950.60	1.07%
TRANSPORTATION ENGINEERING	\$67,860.24	3.06%	\$2,147,278.44	96.94%	\$2,215,138.68	0.38%
TUNNELING	\$0.00	0.00%	\$41,634.31	100.00%	\$41,634.31	0.01%
MATERIALS TESTING	\$7,872,285.85	21.60%	\$28,569,125.51	78.40%	\$36,441,411.36	6.31%
PRELIMINARY STUDIES	\$2,757,014.57	6.37%	\$40,504,581.95	93.63%	\$43,261,596.52	7.49%
RIGHT OF WAY SERVICES	\$175,803.06	4.59%	\$3,655,467.73	95.41%	\$3,831,270.79	0.66%
IRRIGATION DESIGN	\$34,134.00	13.61%	\$216,744.15	86.39%	\$250,878.15	0.04%
OTHER	\$287,499.07	1.66%	\$16,985,568.86	98.34%	\$17,273,067.93	2.99%
TOTAL	\$29,967,240.57	5.19%	\$547,558,918.96	94.81%	\$577,526,159.53	100.00%

Exhibit 3-4 shows that the construction prequalified work codes with the largest level of DBE participation as a percentage of overall dollars expended in that work code are:

- construction traffic control;
- pavement repair;
- pavement marking; and
- structures.

In all of the above categories, DBE participation exceeded 40 percent. DBE firms were awarded no dollars in the following areas

- aggregates;
- bituminous concrete;
- seal coat;
- structure repair; and
- sprinkler system.

**EXHIBIT 3-4
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES - UTILIZATION ANALYSIS
 PRIME CONTRACTORS AND SUBCONTRACTORS
 DOLLARS AND PERCENTAGE OF OVERALL DOLLARS
 BY PREQUALIFIED WORK CODE
 OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

Prequalified Work Code	DBE		NON-DBE		Total	% of
	\$	%	\$	%	\$	Total Dollars
GENERAL CONSTRUCTION	\$236,067.20	4.41%	\$5,122,179.72	95.59%	\$5,358,246.92	0.40%
GRADING (GENERAL)	\$2,370,381.11	2.76%	\$83,563,234.74	97.24%	\$85,933,615.85	6.46%
LIGHT GRADING	\$6,948,734.14	12.68%	\$47,869,009.30	87.32%	\$54,817,743.44	4.12%
AGGREGATES	\$0.00	0.00%	\$16,592,249.81	100.00%	\$16,592,249.81	1.25%
PAVING (GENERAL)	8,666,381.42	7.22%	\$111,284,733.70	92.78%	\$119,951,115.12	9.01%
BITUMINOUS CONCRETE	\$0.00	0.00%	\$975,318.88	100.00%	\$975,318.88	0.07%
SEAL COAT	\$0.00	0.00%	\$1,097,823.62	100.00%	\$1,097,823.62	0.08%
PORTLAND CEMENT CONCRETE	\$3,323,993.14	6.40%	\$48,580,570.62	93.60%	\$51,904,563.76	3.90%
STRUCTURES	\$31,599,066.78	41.67%	\$44,232,463.95	58.33%	\$75,831,530.73	5.70%
SMALL BRIDGES	\$5,353,759.19	15.07%	\$30,176,680.95	84.93%	\$35,530,440.14	2.67%
MINOR STRUCTURES	\$2,780,206.61	3.42%	\$78,441,314.56	96.58%	\$81,221,521.17	6.10%
CURB, GUTTER, FLATWORK	\$7,481,470.55	2.51%	\$290,817,232.02	97.49%	\$298,298,702.57	22.41%
FENCING	\$5,271,562.41	18.20%	\$23,690,575.54	81.80%	\$28,962,137.95	2.18%
GUARD RAIL	\$4,930,789.98	37.17%	\$8,336,162.23	62.83%	\$13,266,952.21	1.00%
LANDSCAPING	\$9,735,454.99	36.25%	\$17,123,636.55	63.75%	\$26,859,091.54	2.02%
PAVEMENT MARKING	\$8,916,149.01	41.95%	\$12,336,916.54	58.05%	\$21,253,065.55	1.60%
CONSTRUCTION TRAFFIC CONTROL	\$55,668,621.07	66.66%	\$27,839,930.65	33.34%	\$83,508,551.72	6.27%
PAVEMENT REPAIR	\$457,705.93	55.67%	\$364,404.74	44.33%	\$822,110.67	0.06%
STRUCTURE REPAIR	\$0.00	0.00%	\$0.00	0.00%	\$0.00	0.00%
ELECTRICAL, SIGNALS	\$1,962,300.34	1.23%	\$157,213,446.10	98.77%	\$159,175,746.44	11.96%
BUILDING CONSTRUCTION	\$1,462,761.55	1.64%	\$87,468,182.86	98.36%	\$88,930,944.41	6.68%
WATERLINE	\$3,487,456.53	16.96%	\$17,074,551.86	83.04%	\$20,562,008.39	1.54%
SPRINKLER SYSTEM	\$0.00	0.00%	\$0.00	0.00%	\$0.00	0.00%
OTHER	\$12,038,299.84	19.93%	\$48,349,618.51	80.07%	\$60,387,918.35	4.54%
TOTAL	\$172,691,161.79	12.97%	\$1,158,550,237.45	87.03%	\$1,331,241,399.24	100.00%

The utilization analysis shows that in both design and construction, there was a general tendency to utilize prime non-DBE/non-ESB² firms more frequently than their DBE or ESB counterparts. When looking at subconsulting or subcontracting, the levels of utilization achieved by DBE or ESB firms were higher than those of DBE or ESB

² The acronym "ESB" refers to Emerging Small Business.

utilization as prime consultants or prime contractors, although still much lower than non-DBE or non-ESB firms.

Construction service awards represented a larger share of the overall dollars expended by CDOT for the study period, whereas design services accounted for 30 percent of the \$1.9 billion contract dollars. CDOT utilized more DBE firms on the subcontractor and subconsultant level for both design and construction projects than on the prime contractor or prime consultant level.

3.2.3 Availability of DBE Prime Consultants and Subconsultants and Prime Contractors and Subcontractors by Work Code

The availability of design firms by work code is shown in **Exhibit 3-5**. The following work codes have the largest numbers of DBE firms available to perform work:

- architecture;
- management (contract admin);
- management (construction);
- civil engineering;
- highway and street design; and
- preliminary studies.

When looking at the percentage of available firms for each work code, DBE firms account for more than 30 percent of available firms in the areas of transportation engineering, traffic engineer, geotechnical engineering, geological engineering and preliminary studies. Non-DBE firms have availability of greater than 90 percent in the areas of sanitary engineering, tunneling, environmental engineering, and mechanical engineering.

**EXHIBIT 3-5
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN SERVICES
 PRIME CONSULTANT AND SUBCONSULTANT AVAILABILITY
 OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

Prequalified Work Code	DBE		NON-DBE		TOTAL
	#	%	#	%	#
ACOUSTICAL ENGINEERING	6	20.69%	23	79.31%	29
ARCHITECTURE	38	25.33%	112	74.67%	150
BRIDGE DESIGN	18	10.71%	150	89.29%	168
BRIDGE INSPECTION	5	12.20%	36	87.80%	41
CIVIL ENGINEERING	30	23.81%	96	76.19%	126
ELECTRICAL ENGINEERING	9	15.79%	48	84.21%	57
ENVIRONMENTAL ENGINEERING	1	5.88%	16	94.12%	17
GEOLOGICAL ENGINEERING	2	33.33%	4	66.67%	6
GEOTECHNICAL ENGINEERING	18	36.00%	32	64.00%	50
HIGHWAY AND STREET DESIGN	27	26.73%	74	73.27%	101
HYDRAULICS	13	16.88%	64	83.12%	77
LANDSCAPE ARCHITECTURE	16	18.82%	69	81.18%	85
MANAGEMENT (CONTRACT ADMIN)	36	21.95%	128	78.05%	164
MANAGEMENT (CONSTRUCTION)	30	20.98%	113	79.02%	143
MECHANICAL ENGINEERING	4	6.67%	56	93.33%	60
SANITARY ENGINEERING	3	4.69%	61	95.31%	64
SOILS ENGINEERING	6	19.35%	25	80.65%	31
STRUCTURAL ENGINEERING	12	22.64%	41	77.36%	53
SURVEYING	18	25.71%	52	74.29%	70
TRAFFIC ENGINEER	13	37.14%	22	62.86%	35
TRANSPORTATION ENGINEERING	19	48.72%	20	51.28%	39
TUNNELING	2	5.71%	33	94.29%	35
MATERIALS TESTING	15	13.16%	99	86.84%	114
PRELIMINARY STUDIES	27	32.53%	56	67.47%	83
RIGHT OF WAY SERVICES	5	20.83%	19	79.17%	24
IRRIGATION DESIGN	3	27.27%	8	72.73%	11
OTHER	17	17.89%	78	82.11%	95
TOTAL	393	20.38%	1,535	79.62%	1,928

Exhibit 3-6 shows the availability, by work code, of construction firms. Of the 646 available DBE construction firms, almost one-third of the firms provided services in the general construction, grading (general), structures and minor structures work codes. However, by relative proportion of DBEs to non-DBEs, DBEs were more concentrated in the fencing, landscaping, construction traffic control, and structures work codes.

EXHIBIT 3-6
COLORADO DEPARTMENT OF TRANSPORTATION
CONSTRUCTION SERVICES
PRIME CONTRACTOR AND SUBCONTRACTOR AVAILABILITY
OCTOBER 1, 1996, THROUGH MARCH 31, 2000

Prequalified Work Code	DBE		NON-DBE		TOTAL
	#	%	#	%	#
GENERAL CONSTRUCTION	58	23.87%	185	76.13%	243
GRADING (GENERAL)	42	25.93%	120	74.07%	162
LIGHT GRADING	22	11.89%	163	88.11%	185
AGGREGATES	14	18.67%	61	81.33%	75
PAVING (GENERAL)	12	16.67%	60	83.33%	72
BITUMINOUS CONCRETE	8	15.38%	44	84.62%	52
SEAL COAT	7	15.22%	39	84.78%	46
PORTLAND CEMENT	21	24.14%	66	75.86%	87
STRUCTURES	49	34.75%	92	65.25%	141
SMALL BRIDGES	15	10.49%	128	89.51%	143
MINOR STRUCTURES	50	22.03%	177	77.97%	227
CURB, GUTTER, FLATWORK	39	24.84%	118	75.16%	157
FENCING	39	44.83%	48	55.17%	87
GUARD RAIL	24	38.10%	39	61.90%	63
LANDSCAPING	37	40.22%	55	59.78%	92
PAVEMENT MARKING	9	29.03%	22	70.97%	31
CONSTRUCTION TRAFFIC	32	38.10%	52	61.90%	84
PAVEMENT REPAIR	11	15.07%	62	84.93%	73
STRUCTURE REPAIR	15	16.48%	76	83.52%	91
ELECTRICAL, SIGNALS	6	18.75%	26	81.25%	32
BUILDING CONSTRUCTION	13	14.94%	74	85.06%	87
WATERLINE	24	18.90%	103	81.10%	127
SPRINKLER SYSTEM	7	15.91%	37	84.09%	44
OTHER	92	50.00%	92	50.00%	184
TOTAL	646	24.99%	1,939	75.01%	2,585

3.2.4 Capability Adjustments

The demographic comparisons for design are shown in **Exhibit 3-7**. As can be seen in the table, the two groups are very similar in terms of capacity based on mean revenue.

**EXHIBIT 3-7
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN SERVICES
 CHARACTERISTICS OF PREQUALIFIED AND
 NON-DBE, NONPREQUALIFIED CONSULTANTS**

Characteristic	Prequalified Consultants Sample	Non-DBE, Non-Prequalified Consultants
White Male Distribution	79%	51%
Mean Revenue	\$24,869,235.44	\$23,115,749.75

When looking at the non-DBE prequalified group as an example, 75 firms were originally in the sample. Once the adjustments for capacity were applied, 73 firms remained. Applying the formula above, the percent change necessary to adjust availability is one percent (see **Exhibit 3-8**). This results in an adjustment of the original availability from 237 to 232.

**EXHIBIT 3-8
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN SERVICES
 AVAILABILITY ADJUSTMENT
 BASED ON CAPABILITY**

Category	Original Availability	Sample	Sample After Capacity	Percent (%) Change	Adjusted Availability
Non-DBE Prequalified	237	75	73	2.7	232
DBE, Prequalified	33	20	17	17.0	27
Non-DBE, Non-prequalified	327	99	98	1.0	323
DBE, Non-prequalified	172	99	96	3.1	166

Exhibit 3-9 shows the demographic comparisons for construction.

**EXHIBIT 3-9
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES
 CHARACTERISTICS OF PREQUALIFIED AND
 NON-DBE, NON-PREQUALIFIED CONSTRUCTION CONTRACTORS**

Characteristic	Prequalified Contractors Sample	Non-DBE, Non-Prequalified Contractors
White Male Distribution	79%	67%
Mean Revenue	\$28,067,743	\$ 13,123,364

Using the non-DBE non-prequalified group as an example, 236 firms were originally in the sample. Once the capacity ranges were applied, 236 firms remained. Applying the formula above, there is no percent change necessary to adjust availability. (see **Exhibit 3-10**). This results in no significant adjustment of the original availability.

**EXHIBIT 3-10
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES
 AVAILABILITY ADJUSTMENT
 BASED ON CAPABILITY**

Category	Original Availability	Sample	Sample After Capacity	Percent (%) Change	Adjusted Availability
Non-DBE Prequalified	290	160	159	0.6	288
DBE, Prequalified	45	25	25	0.0	45
Non-DBE, Non-prequalified	870	236	236	0.0	870
DBE, Non-prequalified	258	171	166	3.0	250

Exhibit 3-11 shows the disparity analysis, using the capability-based availability, of DBE prime consultants and subconsultants combined for the study period. As the chart shows, in two of the work codes (geological engineering and materials testing) DBE firms are overutilized. In all other work codes DBE firms are underutilized. Non-DBE firms are overutilized in all but two work codes.

EXHIBIT 3-11
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES
DISPARITY ANALYSIS OF
DBE PRIME CONSULTANTS AND SUBCONSULTANTS
BY WORK CODE
OCTOBER 1, 1996 THROUGH MARCH 31, 2000

PREQUALIFIED WORK CODES	% OF CONTRACT DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX	DISPARATE IMPACT OF UTILIZATION
DBE FIRMS:				
ACOUSTICAL ENGINEERING	2.88%	20.69%	13.93	* UNDERUTILIZATION
ARCHITECTURE	1.53%	25.33%	6.05	* UNDERUTILIZATION
BRIDGE DESIGN	5.28%	10.71%	49.31	* UNDERUTILIZATION
BRIDGE INSPECTION	0.97%	12.20%	7.98	* UNDERUTILIZATION
CIVIL ENGINEERING	15.21%	23.81%	63.89	* UNDERUTILIZATION
ELECTRICAL ENGINEERING	0.23%	15.79%	1.48	* UNDERUTILIZATION
ENVIRONMENTAL ENGINEERING	3.23%	5.88%	54.83	* UNDERUTILIZATION
GEOLOGICAL ENGINEERING	84.50%	33.33%	253.49	OVERUTILIZATION
GEOTECHNICAL ENGINEERING	28.18%	36.00%	78.27	* UNDERUTILIZATION
HIGHWAY AND STREET DESIGN	3.79%	26.73%	14.17	* UNDERUTILIZATION
HYDRAULICS	2.13%	16.88%	12.62	* UNDERUTILIZATION
LANDSCAPE ARCHITECTURE	1.59%	18.82%	8.46	* UNDERUTILIZATION
MANAGEMENT (CONTRACT ADMIN)	1.72%	21.95%	7.86	* UNDERUTILIZATION
MANAGEMENT (CONSTRUCTION)	4.87%	20.98%	23.23	* UNDERUTILIZATION
MECHANICAL ENGINEERING	2.49%	6.67%	37.35	* UNDERUTILIZATION
SANITARY ENGINEERING	0.00%	4.69%	0.00	* UNDERUTILIZATION
SOILS ENGINEERING	4.37%	19.35%	22.56	* UNDERUTILIZATION
STRUCTURAL ENGINEERING	1.84%	22.64%	8.11	* UNDERUTILIZATION
SURVEYING	3.69%	25.71%	14.36	* UNDERUTILIZATION
TRAFFIC ENGINEER	0.50%	37.14%	1.33	* UNDERUTILIZATION
TRANSPORTATION ENGINEERING	3.06%	48.72%	6.29	* UNDERUTILIZATION
TUNNELING	0.00%	5.71%	0.00	* UNDERUTILIZATION
MATERIALS TESTING	21.60%	13.16%	164.18	OVERUTILIZATION
PRELIMINARY STUDIES	6.37%	32.53%	19.59	* UNDERUTILIZATION
RIGHT OF WAY SERVICES	4.59%	20.83%	22.03	* UNDERUTILIZATION
IRRIGATION DESIGN	13.61%	27.27%	49.89	* UNDERUTILIZATION
OTHER	1.66%	17.89%	9.30	* UNDERUTILIZATION
NON-DBE FIRMS:				
ACOUSTICAL ENGINEERING	97.12%	79.31%	122.45	OVERUTILIZATION
ARCHITECTURE	98.47%	74.67%	131.88	OVERUTILIZATION
BRIDGE DESIGN	94.72%	89.29%	106.08	OVERUTILIZATION
BRIDGE INSPECTION	99.03%	87.80%	112.78	OVERUTILIZATION
CIVIL ENGINEERING	84.79%	76.19%	111.28	OVERUTILIZATION
ELECTRICAL ENGINEERING	99.77%	84.21%	118.47	OVERUTILIZATION
ENVIRONMENTAL ENGINEERING	96.77%	94.12%	102.82	OVERUTILIZATION
GEOLOGICAL ENGINEERING	15.50%	66.67%	23.25	* UNDERUTILIZATION
GEOTECHNICAL ENGINEERING	71.82%	64.00%	112.22	OVERUTILIZATION
HIGHWAY AND STREET DESIGN	96.21%	73.27%	131.32	OVERUTILIZATION
HYDRAULICS	97.87%	83.12%	117.75	OVERUTILIZATION
LANDSCAPE ARCHITECTURE	98.41%	81.18%	121.23	OVERUTILIZATION
MANAGEMENT (CONTRACT ADMIN)	98.28%	78.05%	125.92	OVERUTILIZATION
MANAGEMENT (CONSTRUCTION)	95.13%	79.02%	120.38	OVERUTILIZATION
MECHANICAL ENGINEERING	97.51%	93.33%	104.48	OVERUTILIZATION
SANITARY ENGINEERING	100.00%	95.31%	104.92	OVERUTILIZATION
SOILS ENGINEERING	95.63%	80.65%	118.59	OVERUTILIZATION
STRUCTURAL ENGINEERING	98.16%	77.36%	126.89	OVERUTILIZATION
SURVEYING	96.31%	74.29%	129.65	OVERUTILIZATION
TRAFFIC ENGINEER	99.50%	62.86%	158.30	OVERUTILIZATION
TRANSPORTATION ENGINEERING	96.94%	51.28%	189.03	OVERUTILIZATION
TUNNELING	100.00%	94.29%	106.06	OVERUTILIZATION
MATERIALS TESTING	78.40%	86.84%	90.28	UNDERUTILIZATION
PRELIMINARY STUDIES	93.63%	67.47%	138.77	OVERUTILIZATION
RIGHT OF WAY SERVICES	95.41%	79.17%	120.52	OVERUTILIZATION
IRRIGATION DESIGN	86.39%	72.73%	118.79	OVERUTILIZATION
OTHER	98.34%	82.11%	119.77	OVERUTILIZATION

* The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00, and substantial overutilization above the 120.00 level.

Exhibit 3-12 shows the disparity analysis for DBE prime contractors and subcontractors combined by work code. As the chart shows, in most work codes, DBE firms experience significant underutilization with the exception of the following work codes:

- light grading;
- structures;
- small bridges;
- pavement marking;
- construction traffic control; and
- pavement repair.

Non-DBEs were significantly underutilized in the following work codes:

- construction traffic control;
- pavement repair;
- structure repair; and
- sprinkler system.

**EXHIBIT 3-12
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES
 DISPARITY ANALYSIS OF
 DBE PRIME CONTRACTORS AND SUBCONTRACTORS
 BY WORK CODE
 OCTOBER 1, 1996 THROUGH MARCH 31, 2000**

PREQUALIFIED WORK CODES	% OF CONTRACT DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX	DISPARATE IMPACT OF UTILIZATION
DBE FIRMS:				
GENERAL CONSTRUCTION	4.41%	23.87%	18.46	* UNDERUTILIZATION
GRADING (GENERAL)	2.76%	25.93%	10.64	* UNDERUTILIZATION
LIGHT GRADING	12.68%	11.89%	106.59	OVERUTILIZATION
AGGREGATES	0.00%	18.67%	0.00	* UNDERUTILIZATION
PAVING (GENERAL)	7.22%	16.67%	43.35	* UNDERUTILIZATION
BITUMINOUS CONCRETE	0.00%	15.38%	0.00	* UNDERUTILIZATION
SEAL COAT	0.00%	15.22%	0.00	* UNDERUTILIZATION
PORTLAND CEMENT CONCRETE	6.40%	24.14%	26.53	* UNDERUTILIZATION
STRUCTURES	41.67%	34.75%	119.91	OVERUTILIZATION
SMALL BRIDGES	15.07%	10.49%	143.65	OVERUTILIZATION
MINOR STRUCTURES	3.42%	22.03%	15.54	* UNDERUTILIZATION
CURB, GUTTER, FLATWORK	2.51%	24.84%	10.10	* UNDERUTILIZATION
FENCING	18.20%	44.83%	40.60	* UNDERUTILIZATION
GUARD RAIL	37.17%	38.10%	97.56	UNDERUTILIZATION
LANDSCAPING	36.25%	40.22%	90.13	UNDERUTILIZATION
PAVEMENT MARKING	41.95%	29.03%	144.50	OVERUTILIZATION
CONSTRUCTION TRAFFIC CONTROL	66.66%	38.10%	174.99	OVERUTILIZATION
PAVEMENT REPAIR	55.67%	15.07%	369.48	OVERUTILIZATION
STRUCTURE REPAIR	0.00%	16.48%	0.00	* UNDERUTILIZATION
ELECTRICAL, SIGNALS	1.23%	18.75%	6.57	* UNDERUTILIZATION
BUILDING CONSTRUCTION	1.64%	14.94%	11.01	* UNDERUTILIZATION
WATERLINE	16.96%	18.90%	89.75	UNDERUTILIZATION
SPRINKLER SYSTEM	0.00%	15.91%	0.00	* UNDERUTILIZATION
OTHER	19.93%	50.00%	39.87	* UNDERUTILIZATION
NON-DBE FIRMS:				
GENERAL CONSTRUCTION	95.59%	76.13%	125.56	OVERUTILIZATION
GRADING (GENERAL)	97.24%	74.07%	131.28	OVERUTILIZATION
LIGHT GRADING	87.32%	88.11%	99.11	UNDERUTILIZATION
AGGREGATES	100.00%	81.33%	122.95	OVERUTILIZATION
PAVING (GENERAL)	92.78%	83.33%	111.33	OVERUTILIZATION
BITUMINOUS CONCRETE	100.00%	84.62%	118.18	OVERUTILIZATION
SEAL COAT	100.00%	84.78%	117.95	OVERUTILIZATION
PORTLAND CEMENT CONCRETE	93.60%	75.86%	123.38	OVERUTILIZATION
STRUCTURES	58.33%	65.25%	89.40	UNDERUTILIZATION
SMALL BRIDGES	84.93%	89.51%	94.88	UNDERUTILIZATION
MINOR STRUCTURES	96.58%	77.97%	123.86	OVERUTILIZATION
CURB, GUTTER, FLATWORK	97.49%	75.16%	129.71	OVERUTILIZATION
FENCING	81.80%	55.17%	148.26	OVERUTILIZATION
GUARD RAIL	62.83%	61.90%	101.50	OVERUTILIZATION
LANDSCAPING	63.75%	59.78%	106.64	OVERUTILIZATION
PAVEMENT MARKING	58.05%	70.97%	81.79	UNDERUTILIZATION
CONSTRUCTION TRAFFIC CONTROL	33.34%	61.90%	53.85	* UNDERUTILIZATION
PAVEMENT REPAIR	44.33%	84.93%	52.19	* UNDERUTILIZATION
STRUCTURE REPAIR	0.00%	83.52%	0.00	* UNDERUTILIZATION
ELECTRICAL, SIGNALS	98.77%	81.25%	121.56	OVERUTILIZATION
BUILDING CONSTRUCTION	98.36%	85.06%	115.63	OVERUTILIZATION
WATERLINE	83.04%	81.10%	102.39	OVERUTILIZATION
SPRINKLER SYSTEM	0.00%	84.09%	0.00	* UNDERUTILIZATION
OTHER	80.07%	50.00%	160.13	OVERUTILIZATION

* The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00, and substantial overutilization above the 120.00 level.

Overutilization of DBE Firms and Weighted Distribution by Percentage of Dollars

Exhibit 3-13 shows the impact of the removal of overutilized DBE firms availability of design services firms. The chart shows the availability of firms by work code, and whether they were overutilized. Over-concentrated design firms were found in the areas of geological engineering and materials testing for a total reduction of 3.46 percent.

The final step shown in **Exhibit 3-13** is the weighted distribution of the DBE availability based on the percentage of dollars expended. This calculation is the product of the weighted percentage multiplied by the adjusted availability. **Exhibit 3-14** shows the calculations to adjust the availability of DBEs ready, willing and able to provide construction services. The methodology used for construction services adjustment is similar to that used for the design services DBEs.

EXHIBIT 3-13
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES
SUMMARY TABLE OF STEP ONE AVAILABILITY ANALYSIS

Prequalified Work Code	Base Ready Willing and Able Firms			Adjusted for Capabilitv			Adjusted for Overutilization				Weighted by Dollars Expended	
	DBE		TOTAL	DBE		TOTAL	Overutilized DBEs	DBE		TOTAL	Work Code Total	
	#	%	#	#	%	#		#	%	#	Percent of Dollars Expended	DBE %
ACOUSTICAL ENGINEERING	6	20.69%	29	6	20.53%	29	N	6	20.53%	29	0.65%	0.13%
ARCHITECTURE	38	25.33%	150	38	25.14%	150	N	38	25.14%	150	0.05%	0.01%
BRIDGE DESIGN	18	10.71%	168	18	10.62%	168	N	18	10.62%	168	2.67%	0.28%
BRIDGE INSPECTION	5	12.20%	41	5	12.09%	41	N	5	12.09%	41	1.33%	0.16%
CIVIL ENGINEERING	30	23.81%	126	30	23.63%	126	N	30	23.63%	126	1.86%	0.44%
ELECTRICAL ENGINEERING	9	15.79%	57	9	15.66%	57	N	9	15.66%	57	3.83%	0.60%
ENVIRONMENTAL ENGINEERING	1	5.88%	17	1	5.83%	17	N	1	5.83%	17	9.97%	0.58%
GEOLOGICAL ENGINEERING	2	33.33%	6	2	33.11%	6	Y	0	0.00%	4	0.03%	0.00%
GEOTECHNICAL ENGINEERING	18	36.00%	50	18	35.77%	50	N	18	35.77%	50	1.38%	0.49%
HIGHWAY AND STREET DESIGN	27	26.73%	101	27	26.54%	101	N	27	26.54%	101	35.54%	9.43%
HYDRAULICS	13	16.88%	77	13	16.74%	77	N	13	16.74%	77	0.67%	0.11%
LANDSCAPE ARCHITECTURE	16	18.82%	85	16	18.67%	85	N	16	18.67%	85	0.03%	0.00%
MANAGEMENT (CONTRACT	36	21.95%	164	36	21.78%	164	N	36	21.78%	164	11.61%	2.53%
MANAGEMENT (CONSTRUCTION)	30	20.98%	143	30	20.81%	143	N	30	20.81%	143	6.15%	1.28%
MECHANICAL ENGINEERING	4	6.67%	60	4	6.60%	60	N	4	6.60%	60	0.05%	0.00%
SANITARY ENGINEERING	3	4.69%	64	3	4.64%	64	N	3	4.64%	64	0.07%	0.00%
SOILS ENGINEERING	6	19.35%	31	6	19.20%	31	N	6	19.20%	31	0.81%	0.15%
STRUCTURAL ENGINEERING	12	22.64%	53	12	22.47%	53	N	12	22.47%	53	0.65%	0.15%
SURVEYING	18	25.71%	70	18	25.52%	70	N	18	25.52%	70	3.69%	0.94%
TRAFFIC ENGINEER	13	37.14%	35	13	36.91%	35	N	13	36.91%	35	1.07%	0.39%
TRANSPORTATION ENGINEERING	19	48.72%	39	19	48.47%	39	N	19	48.47%	39	0.38%	0.19%
TUNNELING	2	5.71%	35	2	5.66%	35	N	2	5.66%	35	0.01%	0.00%
MATERIALS TESTING	15	13.16%	114	15	13.04%	114	Y	0	0.00%	99	6.31%	0.00%
PRELIMINARY STUDIES	27	32.53%	83	27	32.31%	83	N	27	32.31%	83	7.49%	2.42%
RIGHT OF WAY SERVICES	5	20.83%	24	5	20.67%	24	N	5	20.67%	24	0.66%	0.14%
IRRIGATION DESIGN	3	27.27%	11	3	27.07%	11	N	3	27.07%	11	0.04%	0.01%
OTHER	17	17.89%	95	17	17.75%	95	N	17	17.75%	95	2.99%	0.53%
TOTAL	393	20.38%	1,928	389 *	20.22%	1,924		372	19.52%	1,907	100.00%	20.99%

*The difference is due to rounding.

**EXHIBIT 3-14
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES
 SUMMARY TABLE OF STEP ONE AVAILABILITY ANALYSIS**

Prequalified Work Code	Base Ready Willing and Able Firms			Adjusted for Capability			Overutilized DBEs	Adjusted for Overutilization			Weighted by Dollars Expended	
	DBE		TOTAL	DBE		TOTAL		DBE		TOTAL	Work Code Total	
	#	%	#	#	%	#		#	%	#	Percent of Dollars Expended	DBE %
GENERAL CONSTRUCTION	58	23.87%	243	58	23.87%	243	N	58	23.87%	243	0.40%	0.10%
GRADING (GENERAL)	42	25.93%	162	42	25.93%	162	N	42	25.93%	162	6.46%	1.67%
LIGHT GRADING	22	11.89%	185	22	11.89%	185	Y	0	0.00%	163	4.12%	0.00%
AGGREGATES	14	18.67%	75	14	18.67%	75	N	14	18.67%	75	1.25%	0.23%
PAVING (GENERAL)	12	16.67%	72	12	16.67%	72	N	12	16.67%	72	9.01%	1.50%
BITUMINOUS CONCRETE	8	15.38%	52	8	15.38%	52	N	8	15.38%	52	0.07%	0.01%
SEAL COAT	7	15.22%	46	7	15.22%	46	N	7	15.22%	46	0.08%	0.01%
PORTLAND CEMENT CONCRETE	21	24.14%	87	21	24.14%	87	N	21	24.14%	87	3.90%	0.94%
STRUCTURES	49	34.75%	141	49	34.75%	141	Y	0	0.00%	92	5.70%	0.00%
SMALL BRIDGES	15	10.49%	143	15	10.49%	143	Y	0	0.00%	128	2.67%	0.00%
MINOR STRUCTURES	50	22.03%	227	50	22.03%	227	N	50	22.03%	227	6.10%	1.34%
CURB, GUTTER, FLATWORK	39	24.84%	157	39	24.84%	157	N	39	24.84%	157	22.41%	5.57%
FENCING	39	44.83%	87	39	44.83%	87	N	39	44.83%	87	2.18%	0.98%
GUARD RAIL	24	38.10%	63	24	38.10%	63	N	24	38.10%	63	1.00%	0.38%
LANDSCAPING	37	40.22%	92	37	40.22%	92	N	37	40.22%	92	2.02%	0.81%
PAVEMENT MARKING	9	29.03%	31	9	29.03%	31	Y	0	0.00%	22	1.60%	0.00%
CONTROL	32	38.10%	84	32	38.10%	84	Y	0	0.00%	52	6.27%	0.00%
PAVEMENT REPAIR	11	15.07%	73	11	15.07%	73	Y	0	0.00%	62	0.06%	0.00%
STRUCTURE REPAIR	15	16.48%	91	15	16.48%	91	N	15	16.48%	91	0.00%	0.00%
ELECTRICAL, SIGNALS	6	18.75%	32	6	18.75%	32	N	6	18.75%	32	11.96%	2.24%
BUILDING CONSTRUCTION	13	14.94%	87	13	14.94%	87	N	13	14.94%	87	6.68%	1.00%
WATERLINE	24	18.90%	127	24	18.90%	127	N	24	18.90%	127	1.54%	0.29%
SPRINKLER SYSTEM	7	15.91%	44	7	15.91%	44	N	7	15.91%	44	0.00%	0.00%
OTHER	92	50.00%	184	92	50.00%	184	N	92	50.00%	184	4.54%	2.27%
TOTAL	646	24.99%	2,585	646	24.99%	2,585		508	20.76%	2,447	100.00%	19.35%

3.3 Step Two Analyses

The processes in Step Two are designed to objectively adjust the base availability established in Step One. This is accomplished through the consideration of the following factors:

- Median Past Participation; and
- Impact of the Southeast Corridor Project.³

Exhibit 3-15 is a summary chart of the Step Two analysis to adjust the ready, willing and able DBE firms established in Step One.

**EXHIBIT 3-15
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES AND CONSTRUCTION SERVICES
SUMMARY TABLE OF STEP TWO AVAILABILITY ANALYSIS**

	STEP ONE DBE AVAILABILITY	MEDIAN UTILIZATION	DBE AVAILABILITY BASED ON MEDIAN PAST PARTICIPATION	SOUTHEAST CORRIDOR PROJECT ADJUSTMENT	FINAL ADJUSTED DBE AVAILABILITY
DESIGN	20.99%	3.06%	12.03%	1.99%	10.04%
CONSTRUCTION	19.35%	6.81%	13.08%	1.25%	11.82%

In **Exhibit 3-15**, we show the adjustment to the DBE availability based on median past participation that takes into consideration the Southeast Corridor Project adjustments. Adjustments made, based on the Southeast Corridor Project, included an examination of documents and data used by CDOT in the project goal setting process. This produces a final adjusted DBE availability that factors in firm capacity and instances of overutilization of DBEs.

³ See Section 2.2.2 of Chapter 2 of this report for a discussion of the impact of median past participation and the Southeast Corridor Project on the adjustment of the base availability.

3.4 State of Colorado

3.4.1 Prime Consultants and Prime Contractors

Exhibits 3-16 and 3-17 show the disparity indices for prime consultants for design projects and prime contractors for construction projects. In the area of design services, DBEs were substantially underutilized during the study period. Substantial underutilization is the result of the fact that DBEs comprise 7.74 percent of firms available to do business with CDOT but receive only 1.39 percent of the contract/task order dollars. Non-DBE firms were overutilized during the study period.

In the area of construction, DBEs were again substantially underutilized during the study period. The reason for this substantial underutilization is that DBEs comprise 11.7 percent of firms available to do business with CDOT, but were awarded 2.48 percent of the contract dollars. Conversely, non-DBE firms were overutilized during the study period.

**EXHIBIT 3-16
COLORADO DEPARTMENT OF TRANSPORTATION
DESIGN SERVICES- DISPARITY ANALYSIS
PRIME CONSULTANTS
OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

DESIGN CLASSIFICATION	% OF TASK ORDER DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX ¹	DISPARATE IMPACT OF UTILIZATION
AFRICAN AMERICANS	0.00%	0.94%	0.00	* UNDERUTILIZATION
HISPANIC AMERICANS	0.37%	1.64%	22.56	* UNDERUTILIZATION
ASIAN AMERICANS	0.76%	1.88%	40.43	* UNDERUTILIZATION
NATIVE AMERICANS	0.00%	0.23%	0.00	* UNDERUTILIZATION
WOMEN	0.26%	3.05%	8.52	* UNDERUTILIZATION
NON-DBE FIRMS	98.61%	92.26%	106.88	OVERUTILIZATION

¹ The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00 level, and substantial overutilization above the 120.00 level.

**EXHIBIT 3-17
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES- DISPARITY ANALYSIS
 PRIME CONTRACTORS
 OCTOBER 1, 1996, THROUGH MARCH 31, 2000**

CONSTRUCTION CLASSIFICATION	% OF CONTRACT DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX¹	DISPARATE IMPACT OF UTILIZATION
AFRICAN AMERICANS	0.00%	0.78%	0.00	* UNDERUTILIZATION
HISPANIC AMERICANS	1.89%	5.46%	34.62	* UNDERUTILIZATION
ASIAN AMERICANS	0.10%	0.78%	12.82	* UNDERUTILIZATION
NATIVE AMERICANS	0.24%	1.30%	18.46	* UNDERUTILIZATION
WOMEN	0.25%	3.38%	7.40	* UNDERUTILIZATION
NON-DBE FIRMS	97.52%	88.30%	110.44	OVERUTILIZATION

¹ The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00 level, and substantial overutilization above the 120.00 level.

3.4.2 Prime Consultants and Subconsultants and Prime Contractors and Subcontractors

Exhibits 3-18 and 3-19 show the disparity indices for prime consultants and subconsultants and prime contractors and subcontractors for design and construction projects awarded by CDOT between October 1, 1996, and March 31, 2000.

The disparity index for prime consultants and subconsultants indicates that non-DBE firms were overutilized during the study period. DBE firms were substantially underutilized during the study period. This analysis indicates that non-DBE contractor firms were also overutilized during the study period and DBE contractor firms were substantially underutilized during the study period.

**EXHIBIT 3-18
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN SERVICES - DISPARITY ANALYSIS
 PRIME CONSULTANTS AND SUBCONSULTANTS COMBINED
 OCTOBER 1, 1996 THROUGH MARCH 31, 2000**

DESIGN CLASSIFICATION	% OF TASK ORDER DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX ¹	DISPARATE IMPACT OF UTILIZATION
AFRICAN AMERICANS	0.36%	2.80%	12.86	* UNDERUTILIZATION
HISPANIC AMERICANS	1.03%	4.20%	24.52	* UNDERUTILIZATION
ASIAN AMERICANS	1.88%	2.80%	67.14	* UNDERUTILIZATION
NATIVE AMERICANS	0.14%	0.84%	16.67	* UNDERUTILIZATION
WOMEN	1.28%	13.43%	9.53	* UNDERUTILIZATION
NON-DBE FIRMS	95.31%	75.93%	125.52	OVERUTILIZATION

¹ The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00, and substantial overutilization above the 120.00 level.

**EXHIBIT 3-19
 COLORADO DEPARTMENT OF TRANSPORTATION
 CONSTRUCTION SERVICES - DISPARITY ANALYSIS
 PRIME CONTRACTORS AND SUBCONTRACTORS COMBINED
 OCTOBER 1, 1996 THROUGH MARCH 31, 2000**

CONSTRUCTION CLASSIFICATION	% OF CONTRACT DOLLARS	% OF AVAILABLE FIRMS	DISPARITY INDEX ¹	DISPARATE IMPACT OF UTILIZATION
AFRICAN AMERICANS	0.51%	1.96%	26.02	* UNDERUTILIZATION
HISPANIC AMERICANS	5.15%	8.77%	58.72	* UNDERUTILIZATION
ASIAN AMERICANS	0.22%	1.25%	17.60	* UNDERUTILIZATION
NATIVE AMERICANS	0.48%	1.02%	47.06	* UNDERUTILIZATION
WOMEN	4.20%	7.21%	58.25	* UNDERUTILIZATION
NON-DBE FIRMS	89.44%	79.79%	112.09	OVERUTILIZATION

¹ The disparity index is the ratio of % utilization to % availability times 100. An asterisk is used to indicate substantial underutilization below the 80.00, and substantial overutilization above the 120.00 level.

3.5 DBE Goals

Exhibit 3-20 presents MGT's recommended overall DBE goals for CDOT's design and construction services. The recommended goals are further divided into race- and gender-neutral and race- and gender-conscious goals.

**EXHIBIT 3-20
 COLORADO DEPARTMENT OF TRANSPORTATION
 DESIGN AND CONSTRUCTION SERVICES
 RECOMMENDED DBE GOALS FOR 2001**

BUSINESS CATEGORY	PERCENT OF AVAILABLE DBE FIRMS	PERCENT OF CONTRACT DOLLARS AWARDED TO PRIME UDBEs	PERCENT OF ALL CONTRACT DOLLARS AWARDED TO	RACE/GENDER NEUTRAL GOAL	RACE/GENDER CONSCIOUS GOAL
DESIGN	10.04%	1.46%	1.23%	2.69%	7.35%
CONSTRUCTION	11.82%	1.27%	1.70%	2.97%	8.85%
OVERALL GOAL	10.93%	1.37%	1.47%	2.83%	8.10%

* Minority or Woman-owned business enterprises

To further narrowly tailor its DBE program to remedy the significant levels of disparity identified, MGT recommends the following actions:

- Continue to set contract specific goals according to the availability of underutilized DBE firms.
- Implement policies and procedures to improve the collection and management of contract data.
- Centralize the collection and management of data.
- Develop a uniform system of coding prequalification and work codes associated with construction and design project.
- On an annual basis, CDOT should continue reviewing its budget and establish annual goals, in dollars and percentages, consistent with DBE availability, for each DBE group that has demonstrated significant underutilization.
- Only DBEs in the relevant market areas should be allowed to benefit from the program.

CDOT is commended for the Web site that has been developed which allows all firms to access various procurement processes and business opportunities as well as the DBE directory, the ESB directory and firms that are underutilized in addition to other related documents.