# EVALUATION OF SAFETY TREATMENTS FOR ROADSIDE CULVERTS

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Roadside cross-drainage culverts have been found to impact vehicle accident injury levels. Designers have commonly used three safety treatments to protect errant drivers from culvert accidents. These treatments have included: culvert extension, guardrail installation and grating. In order to define which safety treatment is the most appropriate, benefit-cost analysis has used accident cost reduction to estimate societal gains earned by using any safety treatment.

The purpose of this study was to estimate accident costs for a wide range of roadway and roadside characteristics so that designers can calculate benefit/cost ratios for culvert safety treatment options under any particular scenario.

This study began with conducting a parametric study in order to find variables which have significant impact on accident cost changes. The study proceeded with highway scenario modeling which included scenarios with different values for combinations of roadway and roadside variables. These variables were chosen based upon findings from the parametric study and their values were assigned based upon highway classification. This study shows that the use of different culvert safety treatments should be flexible to roadway and roadside characteristics. It also shows that culvert extension and grating were the safety treatments found to produce the lowest accident costs for all highway scenarios modeled. Therefore, it is believed that the expanded adoption of culvert extension and culvert grates can improve overall highway safety.

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# 1 INTRODUCTION

## 1.1 Problem Statement

In the United States, approximately 40,000 lives are lost due to traffic fatalities every year (1). Over the years, the number of deaths on the United States' highways has even been higher than war, most diseases, and all natural disasters (2). Approximately one third of all highway deaths have occurred on the roadside. Utility poles, trees, sign supports, culverts, and guardrails are some of the roadside obstacles, most commonly associated with serious ran-off-road accidents. More specifically, striking a culvert or a ditch is the first harmful event for more than 10 percent of the total fatal ran-off-road crashes in the United States (3).

According to American Association of State Highway and Transportation Officials (AASHTO) Roadside Design Guide (RDG) (1), some safety measures may be adopted to reduce hazards created by roadside obstacles. The options, in order of preference, are: (1) remove the obstacle; (2) redesign it; (2 relocate it; (4) reduce the impact severity by using appropriate devices; (5) shield the obstacle; and finally (6) delineate it, if nothing else can be done. In accordance with these options, several research studies have been performed to investigate the viability of treatments for roadside culverts. The most commonly used safety alternatives have been: (1) relocating the hazard by extending the culvert outside the clear zone; (2) reducing the severity of the hazard by placing safety grates over the culvert; (2 shielding the obstacle with guardrail; and (4) delineating the culvert. More than one of these alternatives may be appropriate depending on the specific combination of roadway, roadside and traffic characteristics.

Identifying the most appropriate safety treatment for roadside culverts has not been a simple task. Sometimes, safety treatments have been found to cause more injuries and fatalities than the original culvert. For instance, guardrail installation is an effective safety improvement

on highway sections where high embankments exist. However, guardrail is also a hazard and it must be placed much closer to the travel way than a culvert. In addition, long runs of guardrail are needed to adequately shield traffic from impacting a culvert. These long runs of guardrails placed close to the travel way greatly increase the number of crashes. In fact, placing guardrail to treat small and moderate- sized roadside culverts can actually increase vehicle occupant injuries and fatalities.

Other safety treatments, such as extending the culvert out of the clear zone and placing grates over the culvert also create unanticipated difficulties. Culvert extension creates complicated slope transitions that can also prove to be hazardous to errant motorists. Further, debris can clog grating and reduce the hydraulic flow through the culvert sufficiently to cause flooding problems.

Unfortunately, relatively few studies have focused on developing guidelines for culverts treatments and all of these are now dated. Thus, there is a need to evaluate all of the appropriate culvert safety treatments to determine the most appropriate design for each combination of highway and traffic characteristics.

An evaluation of culvert treatment options should include an incremental benefit to cost analysis. In order to conduct such an analysis, both benefits and direct costs need to be determined. Benefits may be determined in terms of accident cost reduction, while direct costs include installation, repair, and/or maintenance costs. However, direct cost estimation often varies widely from site to site. For instance, costs for culvert extension change from a site to site depending on the amount, cost, and the availability of fill material. Therefore, the direct cost of treating a culvert could be very different even though all other highways and traffic

characteristics are the same. On the other hand, researchers have developed procedures for estimating accident costs to allow one to find the benefits in terms of accident cost reduction.

These techniques attempt to estimate accident costs based upon roadway, roadside, and traffic conditions of a site. Using these techniques, it is possible to relate expected accident costs to roadway and roadside conditions.

After both the benefits and costs have been estimated, one can proceed with an incremental benefit to cost analyses. Even though simple Benefit/Cost (B/C) ratios provide information on which treatment options are cost-effective, one can only find which safety treatment is the most appropriate by using an incremental approach. The general formulation for the incremental B/C ratio is provided in Equation 1.1:

$$B/C \text{ Ratio}_{2-1} = \frac{AC_1 - AC_2}{DC_2 - DC_1} \quad (1.1)$$

where:

$\text{B/C Ratio}_{2-1}$ = Incremental B/C ratio for Alternative 2 to Alternative 1;
$AC_1$, $AC_2$ = Annualized societal crash cost for Alternatives 1 and 2; and
$DC_1$, $DC_2$ = Annualized direct cost for Alternatives 1 and 2.

The difficulty in estimating the direct cost of a safety treatment makes developing culvert treatment selection guidelines very difficult. The wide variations in construction cost can only be addressed by designers calculating these costs on a site by site basis. However, as shown above, a designer can calculate incremental B/C ratios for any site provided direct costs and accident costs of each treatment option.

## 1.2 Study Objective

The primary objective of this study is to develop accident costs for a wide range of highway and traffic characteristics. These accident costs will allow highway designers to estimate the incremental B/C ratios for culvert safety treatment options at any particular site. These accident costs should be applicable to four safety treatment options: 1) Do-Nothing, 2) Culvert Extension, 3) Guardrail Protection, and 4) Grating, as well as to a wide range of highway conditions.

## 1.3 Study Scope

This study is presented in nine chapters as follows: Literature Review, Research Approach, Parametric Study, Accident Cost Prediction, Safety Treatments, Results, Conclusions and Recommendations, and References. This report also contains five appendices. Appendix I shows numerical results from the parametric study; which was undertaken to find roadway, roadside, and traffic characteristics relevant to accident cost changes. Figures 22 through 28 are presented in Appendix II and are intended to help the reader identify the least costly safety treatment for each situation. Appendices III, IV, and V show accident costs as a function of highway characteristics as well as of the applicable safety treatment for the highway classifications: local road, rural arterial and freeway, respectively.

# 2 LITERATURE REVIEW

A summary of relevant information as well as findings from previous research studies are presented below. This chapter is divided into four sections. The first section provides information about the current status of highway and roadside safety. The second section presents cost-effectiveness tools which have been used to evaluate roadside design projects over past years. The third section presents safety alternatives commonly applied to treat roadside culverts, and the fourth explains the limitations and deficiencies of current cost-effectiveness and/or benefit-cost analysis models.

## 2.1 Highway and Roadside Facts

Annually, the number of injuries and deaths occurring due to traffic accidents in the United Sates has remained very high over the last several decades. According to the AASHTO RDG, the number of annual traffic fatalities has been near 40,000 since the mid-1960s, (1). Vehicle accidents have killed more Americans than any war or natural disaster, and most diseases (2). In the year 2005, the number of traffic fatalities reached 43,443 according to the Fatal Accident Reporting System (FARS) (3). In truth, highway safety improvements have reduced the risk of a fatality. Even though the number of fatalities has remained roughly constant, the fatality rate, in terms of fatalities per 100 million vehicle miles traveled (MVMT), has dropped significantly (1). For example, 1.73 fatalities per 100 MVMT occurred in 1994 as compared to 1.44 fatalities per 100 MVMT in 2004. This reduction amounts to nearly a 17 percent decrease in fatalities when total vehicle miles traveled are considered. As can be seen in Figure 1, the fatality rate has had a downward trend when analyzed from the year 1925 to the year 1995.

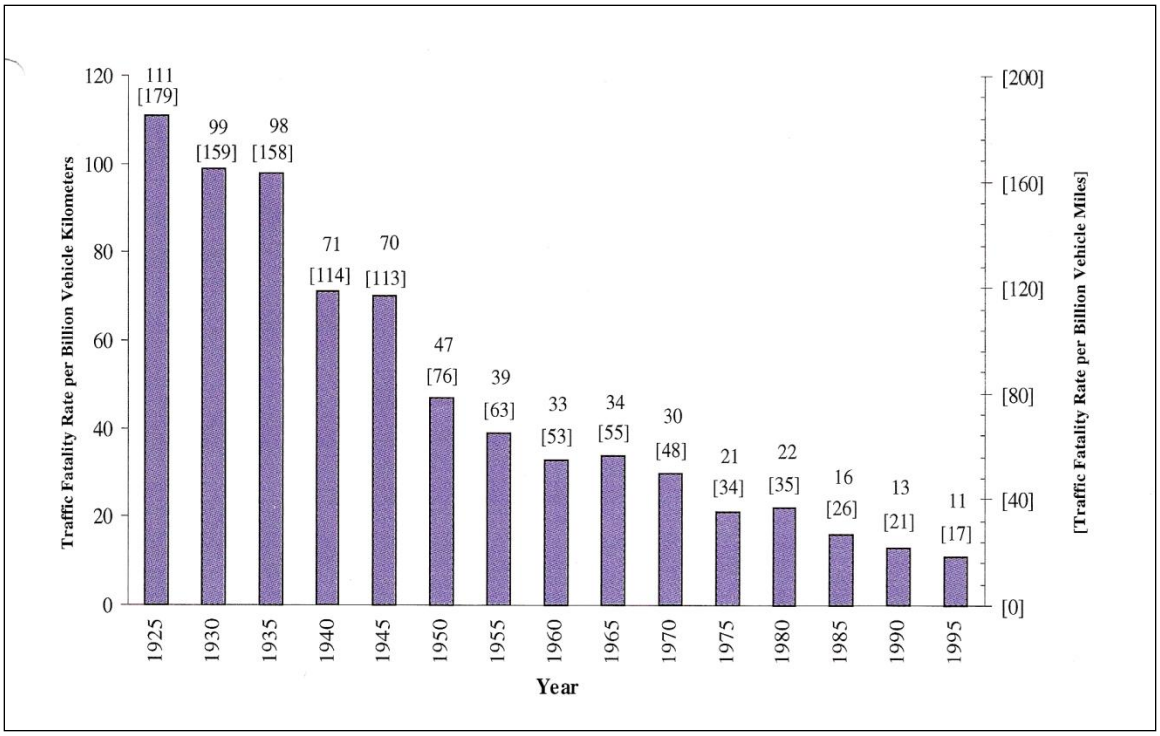


**Figure 1. Annual fatality rates from 1925 to 1995 provided by RDG [1]**

The fatality rate reduction may be attributed not only to improvements in highway standards, but also to other factors such as more enforcement, better driver education, as well as improvements in vehicle design. However, much still has to be done. According to FARS, much effort has to be placed on two specific areas which have been identified as the primary causes of fatal accidents, roadside and intersection (3). According to FARS, in 2005, eighty percent of all fatalities occurred either on roadside areas or on intersections. Fifty-nine percent of these fatalities were involved with roadway departure crashes.

Roadside crashes involve vehicles leaving the roadway and rolling over as well as vehicles leaving the roadway and crashing into a fixed obstacle. Just in North Carolina, these types of accidents accounted for approximately 70 percent of the cross-section related collisions

(4). Culverts and ditches alone have been responsible for approximately 12 percent of all traffic fatalities, as shown in Table 1 from the RDG (2).

**Table 1. First harmful event fixed-object fatalities by object type**

| | YEAR | | | | | | |
|---|---|---|---|---|---|---|---|
| FIXED OBJECT | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
| Boulder | 82 | 96 | 90 | 93 | 87 | 90 | 91 |
| Bridge/ Overpass | 448 | 434 | 459 | 435 | 431 | 402 | 409 |
| Building | 100 | 77 | 77 | 62 | 96 | 78 | 81 |
| Concrete Barrier | 229 | 183 | 229 | 221 | 239 | 259 | 280 |
| Culvert/Ditch | 1,359 | 1,380 | 1,476 | 1,437 | 1,396 | 1,491 | 1,481 |
| Curb/Wall | 810 | 830 | 921 | 947 | 915 | 823 | 753 |
| Embankment | 1,060 | 1,143 | 1,269 | 1,239 | 1,186 | 1,206 | 1,268 |
| Fence | 397 | 441 | 432 | 478 | 429 | 473 | 512 |
| Guardrail | 1,128 | 1,125 | 1,191 | 1,137 | 1,159 | 1,248 | 1,185 |
| Impact Attenuator | 23 | 28 | 35 | 26 | 19 | 19 | 24 |
| Sign or Light Support | 471 | 453 | 580 | 634 | 514 | 504 | 546 |
| Tree/Shrub | 3,035 | 3,014 | 3,198 | 3,128 | 3,220 | 3,226 | 3,348 |
| Utility Pole | 1,274 | 1,096 | 1,135 | 1,096 | 1,111 | 1,092 | 1,070 |
| Other Fixed Objects | 575 | 587 | 564 | 569 | 534 | 508 | 508 |
| Other Pole/ Support | 301 | 350 | 359 | 404 | 359 | 312 | 352 |
| Total Fatalities | 11,292 | 11,237 | 12,015 | 11,906 | 11,695 | 11,731 | 11,908 |

Culverts are structures that are built for drainage purposes and must be placed on the roadside. Consequently, crashes involving culverts have not been uncommon nationwide. Culverts might be located very close to the travel way what makes crashes more likely to occur, as shown in Figure 2. Indeed, culverts have been found to be one of the roadside features that significantly affect the severity of run-off-roadway accidents (5). In another study, culverts were found among the roadside obstacles associated with the highest percentage of severe accidents (6). Unfortunately, developing implementation of safety treatments for roadside culverts has proven to be a difficult task.

**Figure 2. Culvert opening on a local road**

## 2.2 Cost-Effectiveness and/or Benefit-Cost Tools

Transportation funds have decreased in the past decades. Typically, transportation projects have to compete for funding with other sectors, such as health and security. Furthermore, some transportation projects even have to compete with other transportation projects for state and federal funds. Therefore, safety treatments implemented in the transportation sector shall not only be technically but also economically efficient. The technical viability of safety treatments has been generally examined by analyzing crash data, conducting vehicle crash testing, and performing computer simulations of crash tests. The economical viability of treatments has been checked by applying cost-effectiveness and/or benefit-cost analysis methodologies to the proposed alternatives. Several research studies have shown the

efficacy of economical analyses on roadside safety improvement measures (7-17). Many of these studies also reported limitations which restrict the reliability of the results.

Although it is known that limitations still exist, much progress has been achieved over the last four decades. In 1969, the first encroachment probability model was developed (18). This model was based on the encroachment probability approach, which assumes that crash frequency is proportional to encroachment frequency. In order to estimate the encroachment frequency, encroachments are assumed to follow a uniform probability distribution for any highway segment with similar characteristics. The model developed in 1969 was presented in NCHRP Report 77, and it was based upon the Hutchinson and Kennedy encroachment data. This encroachment data is one of the few encroachment data available nowadays (19). This data was developed by taking measurements of wheel tracks on medians in Illinois back in the 1960s. However, this approach has also led to much scrutiny which will be further discussed in Section 2.3.2. The encroachment model was also relatively crude in that it used too long encroachment extents, certainly caused by the use of the Hutchinson and Kennedy encroachment data. The model utilized average values for vehicle type, speed, and angle. Also, the model was limited to point objects. Nevertheless, the model represented the first effort to assess the economic viability of a safety device by relating encroachment rate to cost rates.

Later, changes in the same model were made to allow its use for any type of object (9). Still, many of the other limitations remained. In 1977, the concept of severity index was included in a subsequent model (20). This change was a major improvement over the previous models developed at that time. However, a single severity index was assigned to each hazard, regardless of the type of roadway involved. Further, the severity indices were estimated based on high-speed crashes which tended to overestimate crash severity. Moreover, the procedure was based

upon the assumption that barriers never allowed penetration. As a result, cars would never impact a shielded hazard.

Other important contributions on this topic were made by Post and McCoy, researchers at the University of Nebraska-Lincoln (14-17). These studies used computer simulation of vehicle behavior to model vehicular impacts against different roadside features. Even though the studies used sites with some different characteristics, major limitations existed. Just one vehicle type was used. These procedures still relied upon only one impact angle and one impact speed. Multiple object crashes were not considered.

In the mid-1980s, the Texas Transportation Institute (TTI) developed the TTI ABC Model. This approach presented six major advances over previous models. First, the model used Cooper's encroachment data (21) instead of Hutchinson and Kennedy encroachment data. Second, the model attempted to account for controlled encroachments (22). Third, the model considered the effect of horizontal and vertical alignment on encroachment frequency based on findings from Wright and Robertson (23). Fourth, the model corrected lateral extent and encroachment frequency distributions found by Cooper (21). Fifth, the model was able to analyze multiple hazards at the same time, thereby allowing for the possibility that a vehicle could travel behind or penetrate through a barrier. Lastly, the model included multiple vehicle types as well as multiple encroachment speed and angle distributions. Encroachment speed and angle distributions were based on findings from the study conducted by Mak (25). Even with such advances, the model presented some limitations that made its results inappropriate and its applications difficult. The impact conditions found by Mak tended to overestimate crash severity since the data used was from crashes against bridge rails and utility poles. Also, because the software did not have a user-friendly interface, its use was extremely limited.

In 1988, the TTI ABC Model was modified by the Federal Highway Administration (FHWA). The modified model was called Benefit/Cost Analysis Program (BCAP) (26). A friendlier interface was developed, but the model incorporated inputs for crash and severity prediction that were much more subjective. This greatly reduced the acceptability of the BCAP.

Subsequently, FHWA strived to provide friendlier benefit/cost analysis programs. FHWA, then, developed ROADSIDE which was basically a simplification of BCAP (27). That model, actually, could not be defined as an improvement over BCAP in terms of accuracy of technical results. ROADSIDE did not consider multiple hazard analysis, and it did consider just one combination of vehicle size, speed, and angle. Those considerations were adopted in order to reduce the time required for running BCAP and to make the program more user-friendly. However, those measures were considered to be a step backward in the technical progress of benefit-cost analysis procedures.

In 2003, a new cost-effectiveness procedure, known as the Roadside Safety Analysis Program (RSAP), was developed by Mak and Sicking (28). NCHRP Report 492 contains descriptions on this procedure which evaluates the cost-effectiveness of roadside safety features. This new procedure RSAP adopted a systematic approach composed by four modules. The encroachment module uses encroachment data in order to estimate encroachment frequency along a highway segment. Cooper's encroachment data (21) was used in RSAP because researchers believed that it provided higher quality data than the encroachment data obtained from Hutchinson and Kennedy encroachment data (33-34). The encroachment module assumes equal encroachment probability throughout segments with similar characteristics, and it also adopts adjustment factors in order to control for horizontal and vertical alignments. The encroachment module determines the encroachment rate for a specific roadway segment and,

afterwards, the crash prediction module uses that information in order to estimate crash frequency given an encroachment rate. The primary function of the severity prediction module is to estimate the severity of a crash predicted by the crash prediction module. Therefore, these three modules that were incorporated into RSAP contain analysis procedures which allow the user to determine how many crashes would occur and their respective severities. The fourth module, benefit/cost analysis module, converts all information gathered from the previous modules (i.e., number and severity of crashes) into accident costs. This process is completed by assigning accident cost to each accident severity level. In RSAP, there are three accident cost sets available for use by the analyst. Accident cost is the only parameter that is needed to calculate the benefits (i.e., accident cost reduction) of implementing a safety treatment. RSAP has presented significant improvement in how encroachments and eventual crashes were assigned by adopting a stochastic solution method instead of a deterministic approach. The Monte Carlo simulation technique used by the stochastic approach assigned encroachments randomly. Therefore, the new methodology tended to provide more realistic results than those found when encroachments were assigned deterministically. Among the improvements over the previous models, the RSAP software has been found to be more user-friendly than many of its predecessors (29).

### 2.3 Safety Treatment Options for Roadside Culverts

Over the years, three safety treatments have been applied to roadside culverts, including extending the culvert hazard outside the clear zone, providing guardrail protection in front of the culvert, and covering the culvert opening with grating (7). Even though any of these treatments may produce an overall accident severity reduction, accident frequency may actual increase. For instance, the placement of a guardrail installation in front of a culvert would be expected to

decrease the average accident severity, but it may increase accident frequency due to its closer proximity to the traveled way. A large increase in accident frequency would be expected to produce higher total accident costs. In fact, even though a safety treatment may reduce average impact severity, it may still increase the total number of injuries and fatal crashes.

Available literature about the three most commonly adopted measures used to treat roadside culverts (i.e., culvert extension, guardrail protection, and grating) is described below. Related research on these topics is also presented.

### 2.3.1 Culvert Extension

Culverts have long been recognized as potentially serious roadside obstacles, and engineers have proposed safety treatments to decrease the frequency and/or severity of culvert crashes. The most commonly used safety treatments have been to extend the culvert farther away from the traveled way, to install guardrail, and to place metal grates on the top of the culvert opening. However, in 1978, Kohutek showed that cost-effectiveness and/or benefit-cost analyses indicate that, under certain circumstances, none of those safety treatments may be economically feasible (7). For example, unless the required earth work is minimal and the fill material is abundant, culvert extension tends to be an expensive safety alternative.

Culverts are normally relocated to the edge of the clear zone along a roadway. The clear zone may be defined as a roadside area that is relatively flat and free from roadside obstacles, and a region that is intended to provide drivers with area to redirect the errant vehicle to the roadway or stop it safely. Figure 3 shows a rural freeway segment which contains smooth sideslopes and unobstructed roadside areas.

**Figure 3. Clear zone area on a rural freeway**

Clear zones measuring 30 feet (9.1 meters) wide and with 6:1 embankment slope have been suggested since late 1960s (9). The clear zone concept has been one of the most discussed safety topics addressed by the RDG. As shown in Table 2, clear zone values vary with design speed, average daily traffic, and slope steepness.

Glennon and the Minnesota Department of Transportation have found important clear zone related information (9,30). These studies collected accident data and conducted statistical analyses in order to verify the impact of roadside design policies on single vehicle run-off-the-road accident rates. The safety effect of sideslopes with different steepnesses was examined. Highway accident rates and severities from road sections with 6:1, 4:1, and other steeper sideslopes were compared. Steeper sideslopes usually contained unprotected fixed objects close to the edge of the traveled way. Different highway classifications were adopted as well. Single vehicle run-off-the-road accident data were collected from sites in the States of Illinois,

Minnesota, and Missouri. From this investigation, the highest accident rates were found from sites with sideslopes steeper than 3:1, while the lowest accident rates were found from sites with 6:1 sideslopes. Thus, the design of the roadside, particularly sideslopes, was found to have a direct impact on single vehicle run-off-the-road accident rate.

**Table 2. Clear zone value ranges suggested by RDG (Table 3.1 from the 2002 RDG)**

| DESIGN SPEED | DESIGN ADT | FORESLOPES | | | BACKSLOPES | | |
|---|---|---|---|---|---|---|---|
| | | 1V:6H or Flatter | 1V:5H to 1V:4H | 1V:3H | 1V:3H | 1V:5H to 1V:4H | 1V:6H or Flatter |
| 40 mph (64 km/h) or less | UNDER 750 | 7-10 | 7-10 | ** | 7-10 | 7-10 | 7-10 |
| | 750-1500 | 10-12 | 12-14 | ** | 10-12 | 10-12 | 10-12 |
| | 1500-6000 | 12-14 | 14-16 | ** | 12-14 | 12-14 | 12-14 |
| | OVER 6000 | 14-16 | 16-18 | ** | 14-16 | 14-16 | 14-16 |
| 45-50 mph (72-80 km/h) | UNDER 750 | 10-12 | 12-14 | ** | 8-10 | 8-10 | 10-12 |
| | 750-1500 | 12-14 | 16-20 | ** | 10-12 | 12-14 | 14-16 |
| | 1500-6000 | 16-18 | 20-26 | ** | 12-14 | 14-16 | 16-18 |
| | OVER 6000 | 18-20 | 24-28 | ** | 14-16 | 18-20 | 20-22 |
| 55 mph (88 km/h) | UNDER 750 | 12-14 | 14-18 | ** | 8-10 | 10-12 | 10-12 |
| | 750-1500 | 16-18 | 20-24 | ** | 10-12 | 14-16 | 16-18 |
| | 1500-6000 | 20-22 | 24-30 | ** | 14-16 | 16-18 | 20-22 |
| | OVER 6000 | 22-24 | 26-32 | ** | 16-18 | 20-22 | 22-24 |
| 60 mph (96 km/h) | UNDER 750 | 16-18 | 20-24 | ** | 10-12 | 12-14 | 14-16 |
| | 750-1500 | 20-24 | 26-32 | ** | 12-14 | 16-18 | 20-22 |
| | 1500-6000 | 26-30 | 32-40 | ** | 14-18 | 18-22 | 24-26 |
| | OVER 6000 | 30-32 | 36-44 | ** | 20-22 | 24-26 | 26-28 |
| 65-70 mph (104-112 km/h) | UNDER 750 | 18-20 | 20-26 | ** | 10-12 | 14-16 | 14-16 |
| | 750-1500 | 24-26 | 28-36 | ** | 12-16 | 18-20 | 20-22 |
| | 1500-6000 | 28-32 | 34-42 | ** | 16-20 | 22-24 | 26-28 |
| | OVER 6000 | 30-34 | 38-46 | ** | 22-24 | 26-30 | 28-30 |

Accident rates have also been shown to be sensitive to clear zone widths (9). That is, single-vehicle run-off-the-road accident rates increased as clear zone width decreased from 30 to 20 feet (9.1 to 6 meters). Furthermore, a study of highways with 30-ft (9.1-m) clear zones was conducted by the Minnesota Department of Transportation. This study showed that fatal, injury,

property-damage-only (PDO), and total accident rates were all greater for highway sections with 4:1 embankment slopes within the clear zone as compared to highway sections with 6:1 embankment slopes within the clear zone (30).

In the study conducted by Glennon as well as in the study conducted by the Minnesota Department of Transportation (9, 30), benefit-cost analyses were conducted in order to provide guidelines for where and when to adopt a specific sideslope. From these benefit-to-cost analyses, it was found that the decisions on roadside design should be flexible. That is, they should change according to roadway, roadside, and traffic characteristics. Thus, roadside design policies (i.e., adoption of any clear zone width or allowable slope steepness) should be adjusted for each highway section group with similar characteristics. For instance, it was found that the use of 6:1 slopes can be more cost-effective than 4:1 slopes at traffic volumes between 2,000 and 4,000 vehicles per day (30). In another study, it was found that flattening sideslopes from 3:1 to 7:1 may be related to lower rates of single-vehicle accidents (6).

In a study conducted by Post at the University-of-Nebraska Lincoln, in 1978, the probability of injury accidents was found to significantly decrease by flattening driveway slopes from 3:1 to 8:1. This study also showed that the most cost-effective improvement was a driveway slope from 6:1 to 8:1, while flattening a driveway slope from 8:1 to 10:1 was not cost-effective (14).

### 2.3.2 Guardrail Protection

Shielding has been widely adopted as a safety treatment for roadside obstacles. However, protective barriers that are used to shield obstacles represent a hazard as well (32). As shown in Figure 4, a crash with a guardrail causes significant damage and instability to a pick-up truck used as the crash testing vehicle by the Midwest Roadside Safety Facility (MWRSF). Even

though, in some cases, crashes against barriers may be less severe than other fixed obstacles, accident costs may still increase since they are often installed closer to the roadway than the hazards, thus causing accident frequency to increase.

**Figure 4. A pickup truck strikes a W-beam guardrail in a full-scale crash test**

Cost-effectiveness and/or benefit-cost analyses attempt to identify the optimum guardrail location and length for each group of roadway, roadside, and traffic characteristics. The RDG presents guidelines for determining guardrail length-of-need. The encroachment data used by the RDG comes from research conducted by Hutchinson and Kennedy in the 1960s (19). The encroachment data provided information on the extent of lateral and longitudinal travel by the encroaching vehicles. From that encroachment data, the guardrail runout length was determined. The guardrail runout length is calculated as the distance that a vehicle would have to travel along the roadway in order to go behind the guardrail and strike the hazard. This distance is measured from the point that the vehicle would need to leave the roadway in order to miss the barrier to the

hazard. The RDG essentially uses encroachment data from the Hutchinson and Kennedy study to determine guardrail runout lengths so that guardrail installations should capture the 85$^{th}$ percentile longest encroachment distance.

However, research has shown that traveled distances, found by Hutchinson and Kennedy, are excessive. These encroachment distances were measured from vehicle tracks found in the median. However, there was no means for determining whether these encroachments were controlled or uncontrolled.

The data was collected from newly opened rural interstate freeways with very low traffic volumes, many with less than 5,000 vehicles per day. Further, most of the drivers on these new facilities were unaccustomed to driving on a freeway with wide-flat medians. Hence, drivers were more willing to intentionally pull off of the roadway into the median. When compared to accident data and other sources of encroachment data (e.g., Cooper's study), the data from Hutchinson and Kennedy included a much higher proportion of low angle encroachments, which would indicate a high proportion of controlled or intentional encroachments. Finally, a careful evaluation of the Hutchinson and Kennedy data revealed that the low angle encroachments (i.e., 0 to 5 degrees) were much longer than those from other data sources, while encroachment length compared relatively well for all other angle categories. Hence, it can be concluded that encroachment lengths from Hutchinson and Kennedy's study are excessive and will produce excessive guardrail runout lengths. Runout lengths suggested by Hutchinson and Kennedy are shown in Table 3.

**Table 3. Suggested runout lengths for barrier design by Hutchinson and Kennedy**

| | Traffic Volume (ADT) | | | |
|---|---|---|---|---|
| Design Speed | Over 6000 vpd | 2000-6000 vpd | 800-2000 vpd | Under 800 vpd |
| km/h [mph] | Runout Length | Runout Length | Runout Length | Runout Length |
| | $L_R$ | $L_R$ | $L_R$ | $L_R$ |
| | m [ft] | m [ft] | m [ft] | m [ft] |
| 110 [70] | 145 [475] | 135 [445] | 120 [395] | 110 [360] |
| 100 [60] | 130 [425] | 120 [400] | 105 [345] | 100 [330] |
| 90 [55] | 110 [360] | 105 [345] | 95 [315] | 85 [280] |
| 80 [50] | 100 [330] | 90 [300] | 80 [260] | 75 [245] |
| 70 [45] | 80 [260] | 75 [245] | 65 [215] | 60 [200] |
| 60 [40] | 70 [230] | 60 [200] | 55 [180] | 50 [165] |
| 50 [30] | 50 [165] | 50 [165] | 45 [150] | 40 [130] |

Research performed by Sicking and Wolford as well as by Coon, at the University of Nebraska, has confirmed that Cooper's encroachment data provided more accurate and shorter guardrail runout lengths (33-34). These MWRSF researchers developed simplified charts for determining the appropriate length-of-need for guardrail by using benefit-cost analysis techniques combined with Cooper's data. They could verify that guardrail lengths of need found by using benefit-cost analysis techniques were much shorter than those recommended by the RDG and compared relatively well to procedures developed using Cooper's data. Furthermore, research was undertaken to compare the appropriateness of the two data sets, Hutchinson and

Kennedy's to Cooper's, but also to compare the data sets to real-world crash data (34). According to the findings, guardrail runout lengths recommended by Hutchinson and Kennedy were confirmed to be excessive, while the accident data compared very well to the Cooper data. Therefore, since it is believed that real-world crash data may produce more reliable guardrail length-of-need, it is expected that guardrail systems that are based on the guardrail runout lengths recommended by Wolford and Sicking should produce the most appropriate installation lengths. Runout lengths suggested by Wolford and Sicking are displayed in Table 4.

**Table 4. Runout length values recommended by Wolford and Sicking (33)**

| Design Speed | Runout Length ($L_R$) Given Traffic Volume (ADT), m(ft) | | | |
|---|---|---|---|---|
| km/h (mph) | Over 10,000 | 5,000 to 10,000 | 1,000 to 5,000 | Under 1,000 |
| 113 (70) | 110 (360) | 91 (300) | 79 (260) | 67 (220) |
| 97 (60) | 79 (260) | 64 (210) | 55 (180) | 52 (170) |
| 80 (50) | 64 (210) | 52 (170) | 46 (150) | 40 (130) |
| 64 (40) | 49 (160) | 40 (130) | 34 (110) | 30 (100) |
| 48 (30) | 34 (110) | 27 (90) | 24 (80) | 21 (70) |

Finding optimum guardrail lengths has been crucial to minimize costs and maximize benefits. Although determination of where and when to install guardrails has been widely discussed, there has been relatively little direct research performed on this topic. Guardrails may be placed to protect errant motorists from point or discrete hazards (i.e., traffic control devices and luminary supports) or continuous obstacles (i.e., embankments, ditches, and side slopes). For long obstacles, the use of guardrail installations is more likely to be justified. On the other hand, guardrails are less likely to be used when they are installed to protect errant drivers against point

objects. This is due to the fact that, in the last case, the exposure to roadside obstacles would significantly increase since guardrails may also be analyzed as hazards. Therefore, defining the optimum scenario to erect guardrail installations has been an issue. Several studies have been conducted to provide guidelines to address the confusing problems of when and where to install guardrail systems. These studies make use of cost-effectiveness analyses. These analyses allow one to analyze the guardrail use appropriateness for each specific group of roadway, roadside and traffic characteristics (8, 10, 35-37). These studies have shown that when protecting longitudinal obstacles, the use of guardrail tends to be mostly justifiable on cases of highway sections with the existence of steep slopes and moderate to high traffic volumes (7).

### 2.3.3 Grating

Culvert extension may be a costly alternative where roadside embankments are high as well as where sideslopes are steep. Guardrail installation may increase accident costs when placed on highway segments with sideslopes because, in these roads, the guardrail has to be installed parallel to the travel way. For all of these reasons, grating may appear to be an attractive safety alternative.

Studies conducted by Ross, the New York State Department of Transportation, and the MWRSF have shown that safety grating may be a feasible and effective safety treatment for culvert openings since the culvert ends are made to be traversable (38- 41). It was found that the terrain, on which the grate was located, had a greater effect on vehicle trajectory than the grate itself (39). Actually, sideslopes and ditches were found to be the dominant vehicle tripping mechanism involved in rollovers (42).

However, grating may be an expensive alternative in the case of relatively flat sideslopes, because the length of the culvert opening greatly increases. Larger culvert grates lead to larger and more costly structures.

Recently, small car and pickup truck crash tests were conducted in order to evaluate the safety performance of culvert grates used to shield a large culvert opening located on a 3:1 slope. These vehicles were launched off of the shoulder edge and down the sloped embankments and onto a culvert opening protected by grates. The encroachment angle and speed were 20 degrees and 25 degrees for the small car and pickup truck, respectively, and 62.14 mph (100 km/h) for both tests. An analysis of the test results showed that both vehicles remained quite stable, experienced very low accelerations, and the safety grating system was found to be structurally adequate (41). Figure 5 shows photos taken from the grating system placed on the culvert opening.

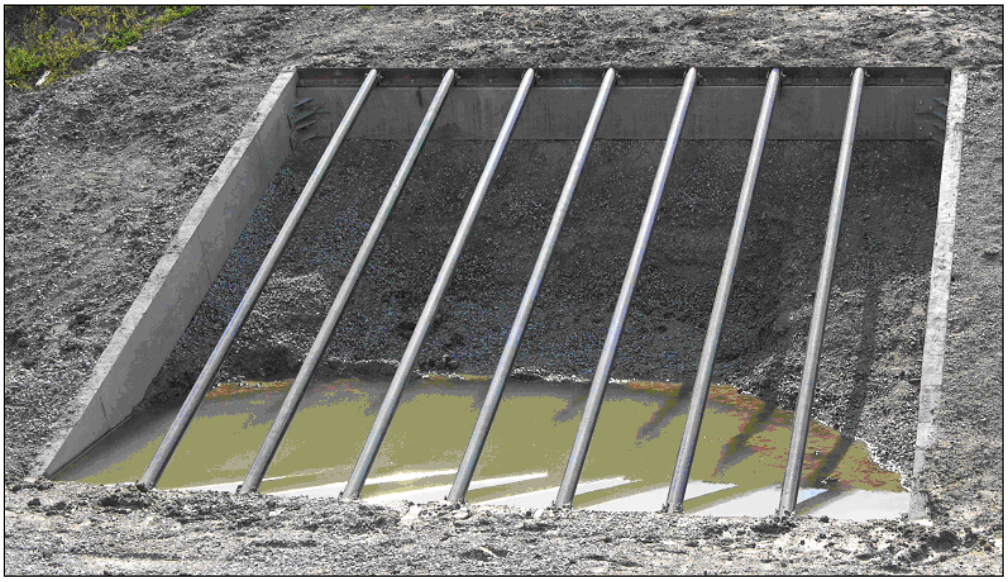

**Figure 5. Safety treatment for cross-section drainage culverts**

## 2.4 Deficiencies of Current Economical Analyses

As described in the Literature Review chapter, much progress on benefit-cost and/or cost-effectiveness analysis procedures over the past decades. However, deficiencies still exist on current procedures, and further research is needed in order to address these problems.

In this section, some issues which lead to inaccuracies on benefit-cost procedures are commented. Three major issues are described as follows.

### 2.4.1 Crash Frequency Accuracy

Limitations on the availability of accident data have seriously retarded roadside safety research. Benefit-to-cost and/or cost-effectiveness analyses may be based on encroachment probability or actual crash data. Both methodologies have been highly used and have their respective pros and cons.

Generally, models based on crash data rely on police accident records. A study conducted by Zegeer and Cynecki described a typical procedure for developing a crash data based model (13). Nonlinear regression models were developed to predict utility pole accident experience as a function of roadway and utility pole characteristics. However, crash data based models require a large amount of data. The large sample size is required because of the large degree of variability in highway and roadside conditions. In addition, it is impossible to consider any factor beyond those provided on police-level accident reports. These factors may directly affect road crash rates, but they can seldom be modeled. For example, 6 to 10 years of accident data were collected by Zegeer and Cynecki, resulting in a sample of more than 9,600 utility pole accidents.

On the other hand, encroachment probability based models essentially involve an attempt to predict accident frequency and severity from basic knowledge about encroachments. That is, it

is assumed that crash frequency is proportional to encroachment frequency. Encroachment probability based models use available encroachment data to estimate accident frequency (28).

Thus, both categories of accident prediction models are based on collected data. This fact has been one of the major sources of uncertainty included in most benefit-cost analyses. That is, crash data based models suffer from the inaccuracies inherent to crashes that were not reported and factors that were not included in the police report. Encroachment probability based models suffer from inaccuracies inherent to the current level of understanding about the nature and frequency of encroachments.

### 2.4.2 Crash Severity Accuracy

For years, it has been known that inaccuracies exist within estimates of both accident frequency and accident severity. To estimate crash severity, the use of the severity index (SI) has been common practice. The SI value serves as an indicator of how severe a single-vehicle crash may be when occurring against a specific obstacle. Based on the SI, the injury level may be classified in different categories (e.g., fatal, injury, or property damage only). Due to their direct impact on injury level determination, estimations of the SI value are crucial for accurate benefit-cost analysis models. A slight change in the SI value may have a significant impact on total estimated accident costs.

Moreover, studies conducted by Turner and Hall concluded that different methodologies used to estimate severity indexes have resulted in very divergent SI values. Different severity indexes were estimated when the same data set were used, just by using different estimation methods (44).

The RDG presents the most comprehensive listing of SI values available today. Even though the severity indexes suggested by the RDG have been widely used, they are largely based

upon one man's judgment regarding average accident severities. In addition, there are severity indexes that are not available for all roadside obstacles. It is believed that most severity indexes were estimated based on crash data and crash tests. However, many roadside obstacles have never been thoroughly tested or included in a detailed accident analysis study. Hence, a great deal of uncertainty remains in the estimation of SI values included in the RDG.

### 2.4.3 Accident Costs

Accident costs are also a very important input parameter within any benefit-cost and/or cost-effectiveness analysis model. In these models, dollar values are assigned to each injury level so that the cost of a collision can be estimated (27-28).

Much complexity has been found in accident cost estimation. Different highway accident costs may be found depending upon the methods used to estimate them as well as what costs are considered. Most historical research studies have recommended that accident cost values be based on comprehensive costs. That is, accident costs should also include indirect costs such as those due to suffering, pain, lost quality of life, and an estimate of the public's willingness to pay to reduce risks (45).

However, accident cost estimation has suffered from inaccuracy, because it has heavily been based on collected crash data. Many unreported low injury level accidents, as well as incorrect information on injury levels written on police reports, are some of the sources of inaccuracy included in accident cost values. For example, a person might not have external, but internal injuries only, and then the accident might be classified as a property damage only accident.

# 3 RESEARCH APPROACH

The study described herein utilized an encroachment probability model, the Roadside Safety Analysis Program (RSAP), to identify the benefits of various culvert safety treatment options. This effort was divided into three major tasks: Parametric Study, Accident Cost Prediction, and Safety Treatments.

The following sections describe procedures associated with each of these tasks.

## 3.1 Parametric Study

A parametric study was undertaken to determine the sensitivity of accident costs to changes in input parameters. This process was intended to identify the highway and roadside characteristics that have the greatest impact on the benefits from a culvert safety treatment. The roadway and roadside parameters found to be important to the estimation of accident costs would be candidates for inclusion in the final benefit estimation procedure while parameters that proved to be less important would be omitted from the study.

The parametric study began with the identification of roadway, roadside and traffic characteristics that could affect accident costs associated with crashes involving roadside culverts. The variables selected for inclusion in the parametric study are shown in Table 5.

After choosing the variables and selecting their values, the sensitivity analysis was conducted by running RSAP to analyze the impact of each variable on accident cost change. The importance of each parameter was then evaluated by changing it to its low, moderate and high values, while values for all other parameters were held constant. By holding all other scenario characteristics constant, the variation in accident costs may be attributed to changes in the variable that has been changed.

**Table 5. Parametric study variables**

| Roadway, Roadside and Traffic Variables Used in the Parametric Study | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Average Daily Traffic (Veh./Day) | Traffic Growth Factor (%) | Horizontal Curvature (Degrees) | Culvert Size (ft) | Slope Steepness | Culvert Offset (ft) | Lane Width (ft) | Number of Lanes (Und.) | Culvert Type | Slope Depth (ft) |
| | | | | | | | | Rounded pipe culvert | 10 |
| | | | | | | | | Rounded pipe culvert with concrete rip-rap | 11 |
| 950 | 0 | 0 | 4x6 | 2 on 1 | 14 | 10 | 2 | Vertical end culvert | 12 |
| 6000 | 2 | 2 | 8x10 | 4 on 1 | 16 | 11 | 6 | Box culvert with tangent wall | 14 |
| 12000 | 4 | 4 | 10x12 | 6 on 1 | 18 | 12 | 10 | Box culvert with flared wall | 20 |

### 3.2 Accident Cost Prediction

As discussed previously, roadway, roadside, and traffic characteristics were selected based upon results from the parametric study. Table 6 shows the seven variables selected for inclusion in the accident cost analysis and presents all variations in each variable included in the study. Note that as shown in the table, variations in parameters were dependent upon highway functional class.

The selected variables were used to model more than three thousand highway scenarios in RSAP. Accident costs were then predicted out of this modeling process. These predicted costs can be used to determine the benefits (i.e., accident cost reduction) of applying each culvert safety treatment on any particular highway scenario.

### 3.3 Safety Treatments

For all scenarios modeled, accident costs were predicted for a total of four safety treatment options. These options are: (1) leave the culvert unprotected, (2) extend the culvert outside the clear zone, (2 shield the culvert with guardrail, and (4) place safety grates over the culvert.

The do-nothing alternative has been defined as the first alternative. For this alternative, no safety treatment was applied. Therefore, there is no cost to implement this safety treatment. Under normal circumstances, the do-nothing alternative should only be chosen if all safety treatment alternatives do not provide an appropriate reduction in accident costs. The unprotected culvert shown in Figure 6 illustrates this safety option.

**Table 6. Roadway, roadside and traffic characteristics used in the main study analysis**

| Slope Steepness | TGF (%) | Curvature (Degrees) | Culvert Size (ft) | Slope Offset (ft) | Culvert Offset (ft) | ADT (Veh./Day) |
|---|---|---|---|---|---|---|
| **Local Highway Class** | | | | | | |
| 2:1 | 0 | 0L | 4x6 | 2 | 4 | 200 |
| | | | | | | 400 |
| | | 5L | 8x10 | 6 | 10 | 800 |
| 4:1 | 3 | | | | | 1600 |
| | | 10L | 10x12 | 10 | 16 | 3000 |
| **Rural Arterial Highway Class** | | | | | | |
| 2:1 | 0 | 0L | 4x6 | 8 | 10 | 1000 |
| | | | | | | 2000 |
| | | 3L | 8x10 | 14 | 18 | 4000 |
| 4:1 | 3 | | | | | 8000 |
| | | 6L | 10x12 | 20 | 26 | 12000 |
| **Freeway Highway Class** | | | | | | |
| 2:1 | 0 | 0L | 4x6 | 8 | 10 | 5000 |
| | | | | | | 25000 |
| 4:1 | 3 | 2L | 8x10 | 16 | 18 | 50000 |
| 6:1 | | 4L | 10x12 | 24 | 26 | 100000 |

**Figure 6. Unprotected roadside culvert**

Culvert extension has been defined as the second alternative. Culvert extension has been one of the most widely used methods for safety treatments of roadside culverts. This safety treatment involves relocating the culvert so that it may be located farther away from the traveled way to reduce the risk of vehicles striking the culvert. Even though culvert extension may provide highway users with high safety levels, it may involve high costs with fill material and earthwork as shown in Figure 7. Culvert extension implements the third option for treating roadside hazards recommended by the RDG.

Guardrail installation has been defined as the third alternative. Guardrail installation should correspond to the fifth option (i.e., shield the obstacle) for treating roadside hazards recommended by the RDG. Figure 8 illustrates the guardrail protection option.

**Figure 7. Culvert extension under implementation**

**Figure 8. Guardrail installed to shield culvert opening**

Even though guardrail erection might seem an efficient, safe and obvious alternative to protect errant drivers from hitting roadside culverts, guardrails can actually increase accident costs in some circumstances. Therefore, it is important that one be aware of where and when guardrail installation would provide attractive benefit/cost ratios.

Grating has been defined as the fourth alternative. This safety treatment consists of placing steel tube grates on the culvert top so that errant vehicles do not fall into the opening. This safety option has shown to be an efficient treatment for moderate-sized culverts (41). In addition, grating can become even more attractive when its implementation costs are taken in account. Its costs can be lower than earth work and guardrail installation costs associated with the second and third options of this study. Figure 9 shows a grating installation placed on a roadside area.

**Figure 9. Grating protection**

# 4 PARAMETRIC STUDY

A parametric study was conducted in order to find the highway and traffic characteristics that have the greatest effect on accident costs associated with culvert accidents. The primary objective of this study was to verify whether accident costs were found to be sensitive to a specific variable or not.

Eleven variables were chosen to be included in the parametric study. All these variables were traffic or highway related. Table 5 shows all chosen variables with the respective values assigned for each one of them.

As shown in Table 5, three values were assigned for each variable with the exception of culvert type for which five types were assigned. The culvert types used were: rounded pipe culvert, rounded pipe culvert with concrete rip-rap, vertical end-culvert, box culvert with tangent wall, and box culvert with flared wall. Note that these culverts represent the most widely used designs across the nation.

The results of the parametric study are presented below. The numerical results from the parametric study are presented in Appendix I.

## 4.1 Side Slope

Accident costs were found to decrease significantly as roadside slopes were flattened. This was true for all four safety treatments. The roadside slope is a hazard that can cause vehicles to rollover and flattened slopes are less likely to create rollover than are steeper slopes. This finding is consistent with accident analysis studies that have shown increase in accident severity as roadside slopes become steeper (9, 30). RSAP indicated a much greater effect from increasing the slope from 4:1 to 2:1 than for flattening the slope from 4:1 to 6:1.

### 4.2 Average Daily Traffic (ADT)

Results show that accident cost increases as ADTs increase. Accident costs almost doubled from ADT 950 to ADT 6,000. However, from ADT 6,000 to ADT 12,000, accident costs slightly increased. This effect arises from the fact that RSAP calculates crash frequency based on encroachment frequency. Furthermore, Cooper's data (21) indicates that encroachment frequency increases rapidly from 0 vehicles per day to an ADT of 5,000. Thereafter, the estimated encroachment frequency flattens out and actually declines somewhat before beginning to increase again as ADT exceed 7,500.

### 4.3 Traffic Growth Factor (TGF)

The parametric study indicated that as TGF increases, accident costs tend to increase. This finding is not surprising since TGF controls how rapidly traffic volume increases over time. Hence, raising TGF can be considered a surrogate for raising traffic volume.

### 4.4 Slope Offset

Results show that accident costs decreased as the slope offset distance got longer. Moving the roadside slope farther from the travel way would reduce the number of vehicles that reach the hazard and fewer crashes lead to lower accident costs.

### 4.5 Culvert Offset

RSAP results show that accident costs from culvert extension option decreased slightly as culvert offset distance got longer; but for the other three alternatives, accident cost variation was not significantly affected by the culvert offset at all. For the first alternative (i.e., leave the culvert unprotected), accident cost remained roughly the same. This result can be attributed to the fact that increasing culvert offset, without increasing the offset to the start of the roadside embankment would necessarily increase the depth of the roadside slope. Deeper roadside slopes

are more severe and this increased risk of a serious slope accident counter balanced the reduced risk of a culvert crash. Notice that as the culvert gets farther from the traveled way, the slope gets deeper for construction and safety reasons (i.e., culverts are constructed with the bottom of the pipe flush with the bottom of the ditch). For the third and fourth alternatives (i.e., guardrail protection and grating), the same thinking applies. For the second alternative (i.e., culvert extension), while there was no significant difference in accident costs between scenarios with culvert offsets of 14 feet (4.2 meters) and 16 feet (4.8 meters), costs dropped as the culvert offset distance increased from 16 feet (4.8 meters) to 18 feet (5.5 meters). Note that, for culvert extensions, some procedures were adopted. First, culverts were extended to a minimum required distance from the travel way. This distance is suggested by the RDG and shown in Table 2. Second, sideslopes had to match with the culvert top. Third, slope steepness values had to be integer values for construction reasons. That is, no slope steepness values such as 4.5:1 or 6.55:1 were used. Because of these procedures, culverts with initial offsets of 14 and 16 feet (4.2 and 4.8 meters) were extended to a final position of 26 feet (7.9 meters) from the travel way, while the culvert with initial offset of 18 feet (5.5 meters) was extended to a final position of 34 feet (10.4 meters) from the travel way.

**4.6 Horizontal Alignment**

Results show that accident costs are higher as horizontal curves become sharper. RSAP was found to be very sensitive to horizontal radius. RSAP uses adjustment factors, based on the Georgia study (13), to deal with encroachment frequency values. Horizontal alignment was one more parameter added to the main analysis of this study.

### 4.7 Culvert Size

The results show that accident costs tend to increase as culvert size increases. This finding may be attributed to the fact that larger culverts have higher severity and present a larger target to be struck. Furthermore, deeper slopes must be present when larger culverts are used.

### 4.8 Slope Depth

It was found that accident costs did not follow any consistent trend when varying slope depth. This finding was attributed to the fact that as slope depth changed, other variables (e.g., slope width, culvert offset distance, and guardrail length-of-need) changed as well. Therefore, slope depth was allowed to be controlled as a function of other parameters.

### 4.9 Lane Width

Results show that accident costs slightly increased as lanes got narrower. It seems reasonable to assume that vehicles encroach the roadside more often when traveling on narrower highway lanes. However, because accident cost variations were within a very short range, lane width was not added as one more parameter in the main analysis of this study.

### 4.10 Number of Lanes

Results show that adding traffic lanes increased accident costs. Considering that the traffic volume is roughly the same on all lanes, accident costs were expected to decrease as the number of lanes increase. A careful evaluation of the RSAP program revealed a bug in the code that led to this problem. The RSAP code was found to correctly evaluate roadways with four lanes or less. Hence, the code was implemented for the remaining of the study and only two or four lane highways were considered.

### 4.11 Culvert Type

Five different culvert types were used in the analysis, including rounded pipe culvert, rounded pipe culvert with concrete rip-rap, vertical end culvert, box culvert with tangent wall, and box culvert with flared wall. These five types represent most of the culverts in use today. Scenarios with rounded pipe culverts presented the lowest accident costs, while scenarios with culvert vertical end culverts presented the highest accident costs. This can be attributed to the fact that the rounded pipe culvert has the lowest accident severity index while the vertical end culvert has the highest accident severity index. The difference between the lowest and highest accident costs was less than 15 percent for all alternatives studied. Even though there is a difference of more than fifty percent between the lowest and highest accident severity indexes, changes on culvert type do not increase accident exposure; therefore, changes on them only are not expected to raise accident costs significantly. Due to small accident cost differences as well as to time and cost constraints, culvert type was not taken in account.

Based upon the parametric study, described above, four variables were found to have relatively limited impact on accident costs. These four variables: number of lanes, lane width, slope depth, and culvert type, were therefore eliminated from the remaining of the study.

# 5 ACCIDENT COST PREDICTION

As stated in Section 1.2, the main objective of this study is to determine accident costs in order to allow highway designers to estimate the incremental B/C ratios for culvert safety treatment alternatives under different roadway and traffic conditions. In order to determine B/C ratios, Benefit-Cost procedures were used. Such procedures are commonly used as an economic tool to aid decision-making. In benefit-cost analyses, the benefits and costs are estimated in terms of the public's willingness to pay for them and willingness to pay to avoid them, respectively. In transportation, benefits are generally measured as the monetary value associated with variables such as reduction in injuries, fatalities, property damage, travel-time, and vehicle operating costs. On the other hand, costs are measured as the direct monetary resource that has to be spent in order to achieve the benefits. Costs include construction, repair, and/or maintenance costs.

Even though benefits are hard to determine, estimating them is made possible by using RSAP. RSAP incorporates stochastic simulation technique to estimate the number of crashes as well as their respective severity (28). RSAP attempts to link the risk of run-off-road crashes to measured encroachment rates and encroachment/crash characteristics. RSAP incorporates the most advanced encroachment probability crash prediction technique available today. RSAP attributes accident costs to five different accident injury levels, as shown in Table 7.

FHWA Comprehensive Costs were used as the used accident costs. These costs include not only direct but also indirect costs associated with highway crashes such as the costs of pain, suffering, and reductions in quality of life. By adopting these comprehensive costs, analysis should tend to be more accurate (45).

**Table 7. FHWA Comprehensive Costs**

| INJURY LEVEL | ACCIDENT COSTS (U$$) |
|---|---|
| Property Damage Only (PDO) | 2,000 |
| Minor Injury | 19,000 |
| Moderate Injury | 36,000 |
| Severe Injury | 180,000 |
| Fatal Injury | 2,600,000 |

RSAP estimates the accident costs for any specific roadway and roadside conditions. In order to identify accident costs over a wide range of highway conditions; it was necessary to run RSAP for a wide range of highway conditions. As shown in Table 6, combinations of traffic, roadway, and roadside variables were used in order to predict accident costs from a wide range of roadway and roadside characteristics. Variations in each of these variables incorporated in the RSAP analysis are presented below.

### 5.1 Local Road

Local roads provide land access and circulation to residential, commercial, and industrial areas. They do not require much right-of-way land acquisition and, as a result, roadside obstacles and obstructions are not far from the travel way. Based on this, slope and culvert offset distances were chosen to be short. Values of 2, 6, and 10 feet (0.6, 1.8, and 3 meters) were selected for slope offset and values of 4, 10, and 16 feet (1.2, 3, and 4.8 meters) were selected for culvert offset. Slope steepness values of 2:1 and 4:1 were used which reflects the types of slopes commonly found on constructed roadways with low traffic volumes and design speeds.

Local roads primarily serve intra-country level travels with relatively short distances. Further, low traffic volumes are observed on these roads. Therefore, large degrees of horizontal curvature are also acceptable. Based on this, low traffic volumes of 200, 400, 800, 1,600, and 3,000 vehicles per day, as well as relatively sharp horizontal curvatures of 0, 5, and 10 degrees were incorporated into the analysis. These values for horizontal curve radius were assigned based on the Exhibit 3-14 (Minimum Radius for Design of Rural Highways, Urban Freeways, and High-Speed Urban Streets Using Limiting Values of e and f) from "A Policy on Geometric Design of Highways and Streets" (43). The same procedure was used to calculate horizontal curvature degrees for freeway and rural arterial highway classes.

Note that culvert sizes were equally selected for all three highway classes. Culverts with sizes of 4 by 6 feet (1.2 by 1.8 meters), 8 by 10 feet (2.4 by 3 meters) and 10 by 12 feet (3 by 3.6 meters) were selected. Even though it is known that there are much larger culverts on real-world highways, especially on local roads, the selected sizes are the most commonly seen culvert sizes across the nation. Furthermore, it would be unrealistic to adopt grating as an appropriate safety treatment for extremely large culverts since this treatment is impractical for such roadside structures. The structural capacity required for the grates to overcome too lengthy spans would make this treatment not feasible.

Traffic growth factors were also equally selected for all three highway classes. Considering that traffic volumes grow as employment and population raises, the assumption of equal traffic growth factors for all three highway classes should not be an issue because most parts of the transportation network are mostly located on rural areas where population and employment growth are comparable in most regions.

### 5.2 Rural Arterial

Rural arterial highways provide a higher degree of mobility compared to local roads, but they do not provide the same degree of accessibility as local roads. Rural arterial highways generally have fewer at grade intersections and move at higher operating speeds than local roadways. Clear zones and shoulders are also usually wider than those for local roads. Traffic volumes for these roadways typically range from 1,000 to 10,000 vehicles per day and speed limits typically range from 40 to 60 mph (64 to 96 km/h).

The slope and culvert offsets adopted for this highway class reflect required offsets for these particular operational and design characteristics. Values of 8, 14, and 20 feet (2.4, 4.2, and 6 meters) were selected for slope offset while values of 10, 18, and 26 feet (3, 4.8, and 7.9 meters) were selected for culvert offset. Similarly, traffic volumes and horizontal curvatures of 1,000, 2,000, 4,000, 8,000, and 12,000 vehicles per day and 0, 3, and 6 degrees, respectively, were assigned to this highway class.

### 5.3 Freeway

Freeways are high-speed transportation facilities with full access control. They usually carry high traffic volumes. Thus, average daily traffic of 5,000, 25,000, 50,000, and 100,000 vehicles per day were assigned for this study. Even though it is known that there are freeways that carry much higher traffic volumes, it is believed that these values correspond to traffic volumes carried by most freeways.

Safety standards require freeways to have relatively wide shoulders and clear zone distances. Therefore, relatively lengthy slope and culvert offset distances as well as flatter roadside slopes are required. Based on this situation, slope offset distances of 8, 16, and 24 feet (2.4, 4.8, and 4.8 meters) and culvert offset distances of 10, 18, and 26 feet (3, 5.4, and 7.9

meters) were selected. Further, instead of using only 2:1 and 4:1 sideslope steepnesses, as used for local and arterial highways, sideslope steepness of 6:1 was also selected for freeways.

Because drivers travel at high speeds when driving on freeways, the horizontal alignment must be much smoother than on other highway classes. Thus, the degrees of curvature used with freeways were limited to 0, 2, and 4.

# 6 SAFETY TREATMENTS

Four safety treatments were chosen for this study. They are: do-nothing, culvert extension, guardrail installation, and grating. Applications of RSAP to model these treatments are presented below.

## 6.1 Do-nothing

The do-nothing option consists of applying no safety procedure to treat the culvert. Under normal provision of transportation funds, the do-nothing option must only be adopted if there is of benefit on adopting any other safety treatment.

## 6.2 Culvert Extension

Although culvert extension appears to be an efficient safety treatment for roadside culverts, it might not be economically feasible when all costs are considered. In order to extend a cross-drainage culvert out of the clear zone, the roadside embankments must be flared away from the travel way. If flared at a high rate, the flared embankment itself can prevent a serious rollover risk. However, large fill volumes become necessary when low flare rates are used.

Culverts are normally extended to the edge of the clear zone. Thus, for purposes of this study, culverts were extended to the edge of the clear zone in the RDG. The following sections explain how the appropriate clear zone was selected and how extension was accomplished in RSAP.

### 6.2.1 Clear Zone Concept

Clear zone may be defined as the unobstructed, relatively flat area on the roadside intended to provide errant drivers with the chance for recovery. Thus, the main function of the clear zone is to provide errant vehicles chances to stop safely or to take recovery action to go back to the traveled way.

The RDG recommends that clear zone width be selected based on the design speed, average daily traffic, and sideslope steepness, as shown in Table 2. The RDG provides ranges of clear zone values for each group of these three highway characteristics. Clear zone widths can be selected from anywhere within the recommended range. Therefore, other factors such as right-of-way availability, environmental impacts, and funding constraints should be considered as well. Cost-effectiveness studies have also shown that roadside policies should be flexible in relation to adoption of clear zone areas (30).

It was impossible to consider site specific issues such as environmental impacts and availability of right-of-way in the study. Hence, average clear zone values were selected from Table 2 of the RDG. For example, for a highway section with average value for each range was used. For instance, for a highway section with average daily traffic of 8,000 vehicles per day, design speed of 70 mph (112.6 km/h) and slope steepness of 8:1, the RDG recommends a clear zone range from 30 to 34 feet (9 to 10.2 meters). The 32-feet (9.6-meters) average value was selected for use in the current study.

Another important decision in the design of a culvert extension is the selection of slope steepness. Recall that slope steepness is one of the three factors that have direct influence on determining recommended clear zone distance. For purposes of this study, slope steepness was chosen based on the clear zone associated with the pre-existing roadside and geometric characteristics of the roadside. The culvert was then extended to the edge of the clear zone. The top of the culvert then defined the location of one of the slope break points along the roadside. The new slope was then created that extended from the existing edge of the shoulder to the top of the culvert. The following paragraphs illustrate the culvert extension design process.

Culvert extension of Scenario 1 from the rural arterial highway section is described below. The characteristics of this highway section are shown in Appendix IV. The pre-extension roadside geometry for the scenario is shown below in Figure 10.

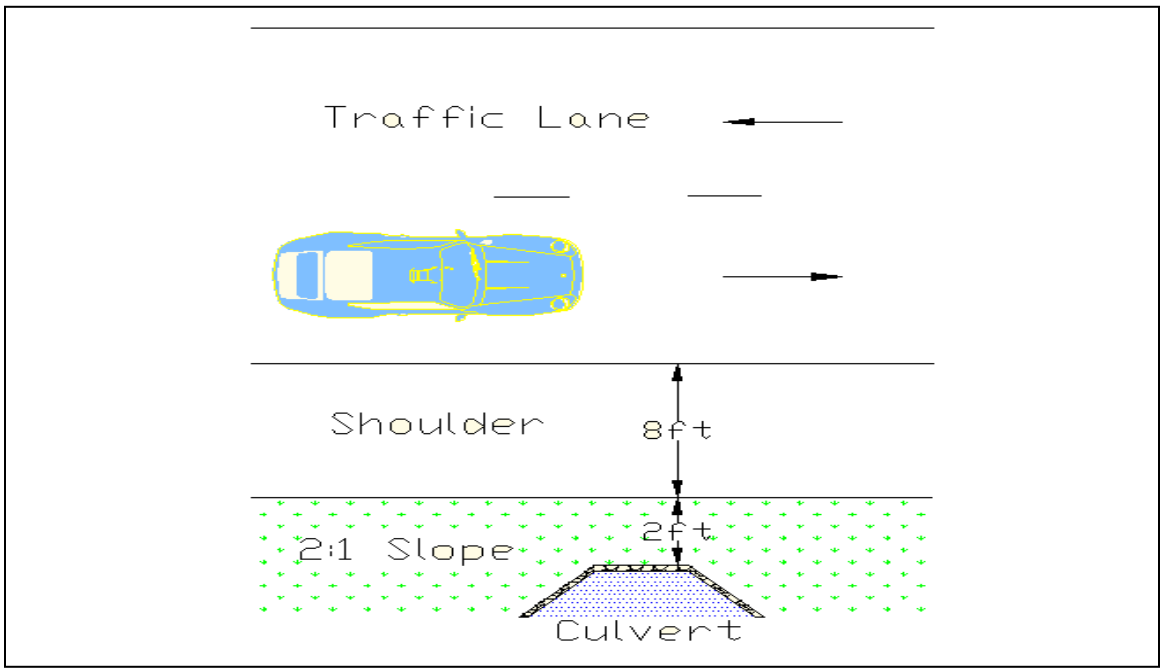


**Figure 10. Plain view of scenario 1 from the rural arterial highway class**

Table 2 from the RDG was used to select the appropriate clear zone distance based upon the design speed of 60 mph (96.5 km/h), average daily traffic of 1,000, and slope steepness of 6:1 or flatter. Based on these parameters, Table 2 from the RDG recommends a clear zone distance of 20 to 24 feet (6 to 7.2 meters). As noted above, the average value of 22 feet (6.6 meters) from Table 2 was used in the current study. The cross-section of the final position of the culvert is shown in Figure 11.

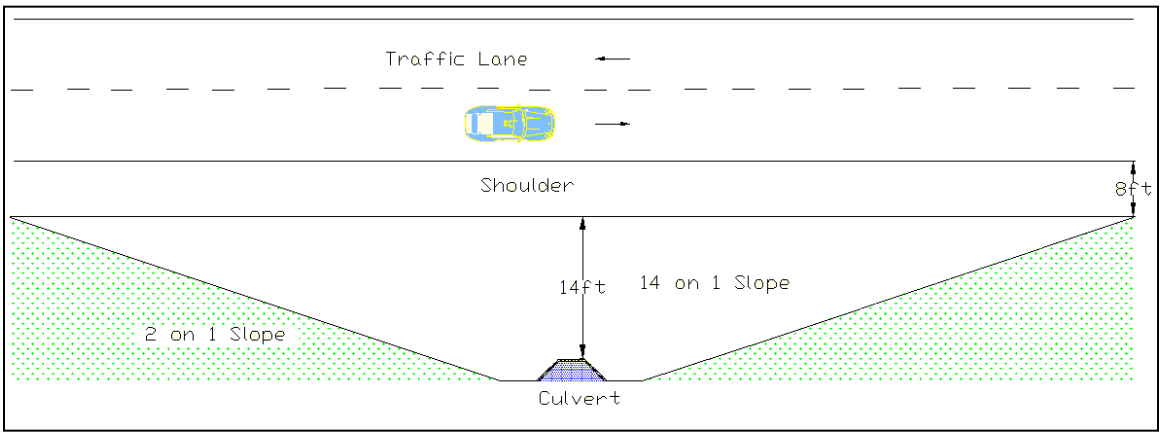


**Figure 11. Scenario configuration after culvert extension**

Unfortunately, RSAP is only able to model rectangular hazards while the slopes associated with the culvert extension are triangular as shown in Figure 11. In order to model triangular hazards, a series of rectangular hazards were input into RSAP. In order to define the most appropriate model configuration, a study was undertaken to determine how many rectangles would suffice to converge outputs to relatively stable results.

The entire slope was divided into small rectangular hazards to create a "mesh". A series of slope models with various numbers of rectangular hazards was analyzed including one, two, three, four, and five rectangles. Figures 12 through 16 show the possible configurations for the same scenario according to the number of rectangles adopted.

Accident costs for the models shown in Figures 12 through 16 were calculated using RSAP so that one can see how much accident costs changed as the mesh was refined.

It was found that accident costs increased as the number of rectangles increased. This may be attributed to the fact that the more rectangles the scenario has, the smaller the flattened sideslope area is. However, the degree of accident cost increase was small. Then, it was necessary to define how many rectangles are needed to provide an accurate benefit analysis

while considering time and cost constraints. As the number of rectangles used on the highway scenario increased, the scenario modeling time enormously increased.

Further, the increase in accident costs with mesh refinement was found to be only 2 percent as each rectangle was added. Thus, highway scenarios with three rectangles were used when applying the culvert extension safety treatment.

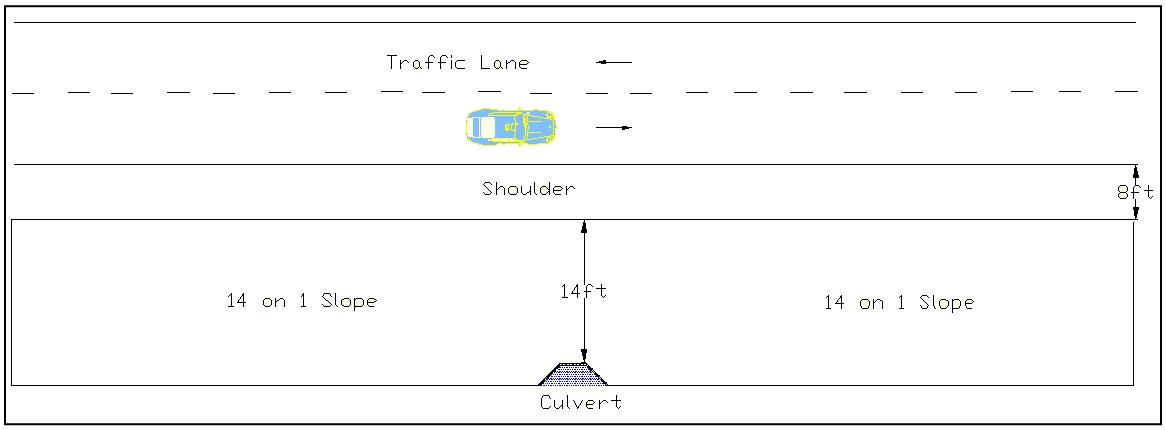


**Figure 12. Scenario with one rectangle**

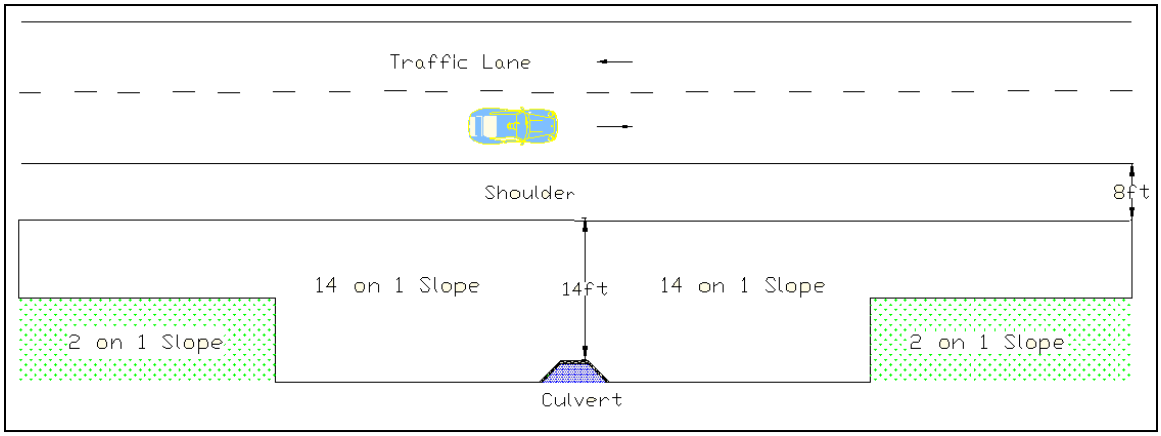


**Figure 13. Scenario with two rectangles**

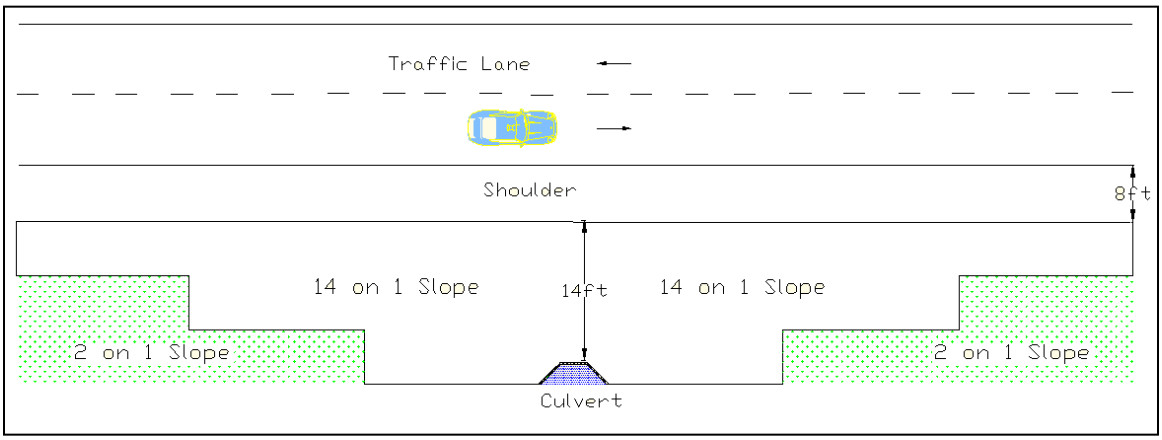


**Figure 14. Scenario with three rectangles**

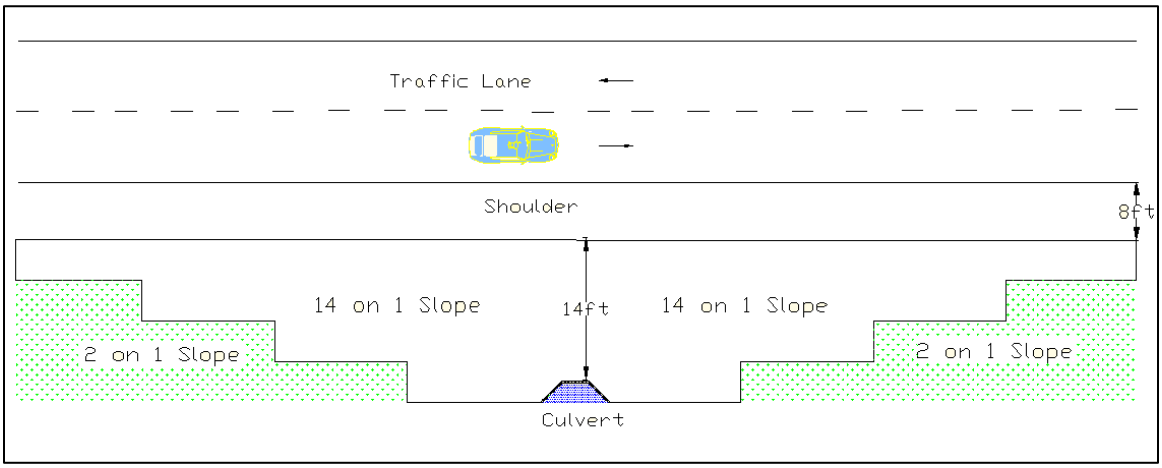


**Figure 15. Scenario with four rectangles**

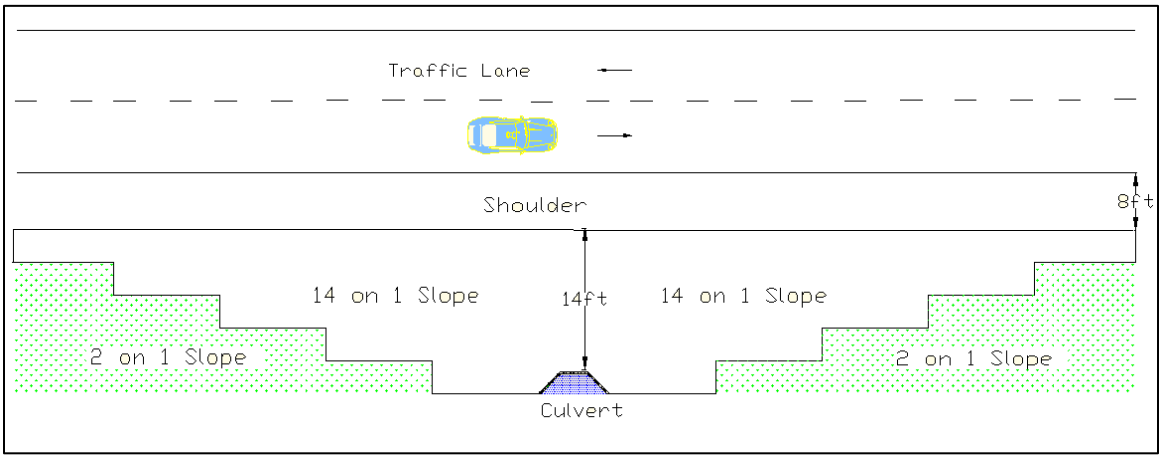


**Figure 16. Scenario with five rectangles**

### 6.3 Guardrail Installation

Guardrail installation was used as the third safety treatment. Accident frequency is expected to increase when a guardrail is used to protect errant drivers from hitting a roadside culvert because guardrails must be closer to the traveled way than the hazard intended to be shielded. Further, a guardrail must be much longer than the hazard in order to prevent vehicles from running behind the guardrail and striking the hazard. In some circumstances, guardrails can actually increase accident costs by raising accident frequency sufficiently to overcome the benefits of reduced accident severity. Proper locations to use protective barriers are sites where the costs associated with accidents, without guardrails, are higher than costs associated with accidents with guardrails. These sites may include highway scenarios with extremely large culverts and deep drop offs as shown in Figure 17.

**Figure 17. Culvert opening shielded by a guardrail installation**

A TL-3 W-beam guardrail was selected for use in this study because it represents the most widely used system across the nation. Guardrail length-of-need was calculated based on the methodology used by the RDG which adopts the following equation for guardrail length-of-need determination:

$$x = \frac{L_a + (b/a)(L_1) - L_2}{(b/a) + (L_a/L_r)} \qquad (0.0.2)$$

where:

$b/a$ = Flare rate;
$L_1$ = Tangent length of barrier upstream from the hazard;
$L_2$ = Lateral distance from the edge of the traveled way;
$L_a$ = Distance from the traveled way edge to the back of the hazard; and
$L_r$ = Runout length.

Figure 18 shows what each variable listed above represents on a guardrail installation layout.

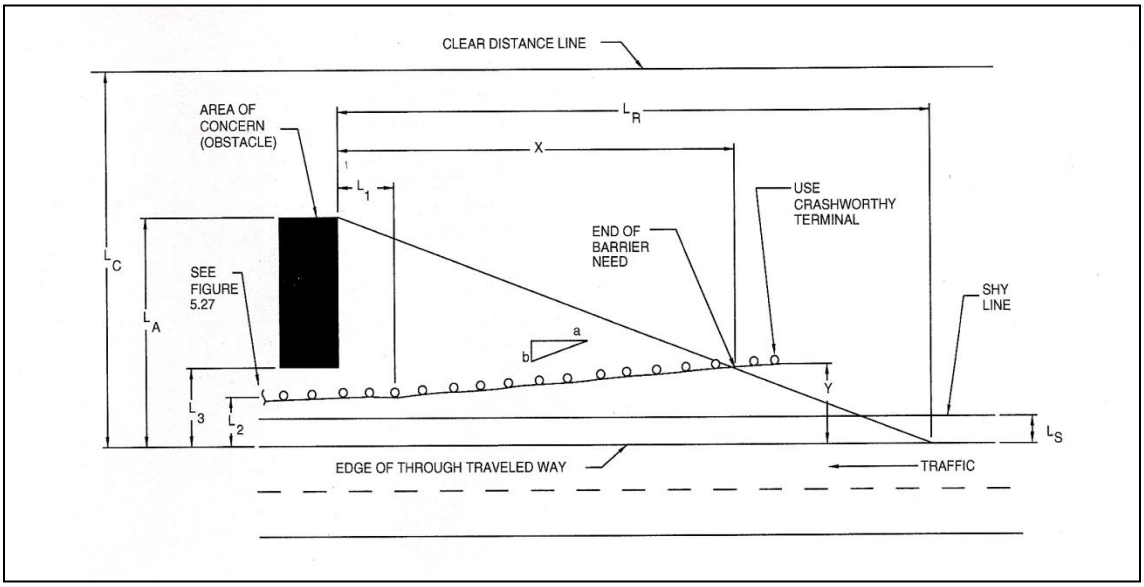


**Figure 18. Figure 5.24 from the RDG 2002: "Opposing barrier layout variables"**

In Equation 6.3.1, flare rates were considered. The main reasons behind using flare rates are to decrease accident frequency since the guardrail installation gets farther from the roadway

and to decrease costs by adopting shorter guardrail systems. Figure 19 shows a flared guardrail installation which requires relatively flat sideslopes beyond the shoulder.

**Figure 19. Flared guardrail installation**

However, culverts are roadside obstacles that are placed on roadside slopes. Guardrail use was restricted to tangent installations since guardrail cannot be safely flared onto steep slopes and slope steepnesses used in this study were not flat enough to use flared guardrail installations. Figure 20 shows a tangent guardrail installation placed right beyond the roadway shoulder.

**Figure 20. Tangent guardrail installation**

When flare rate is removed from Equation 6.3.1, the formula for guardrail length-of-need becomes:

$$x = \frac{L_a - L_2}{L_a / L_r} \tag{6.3.2}$$

The runout length $L_r$ is the theoretical distance needed for most vehicles that leave the roadway to come to a stop. This variable is directly linked to values for the distance traveled by encroaching vehicles. The RDG suggests values for runout lengths that are essentially based on encroachment data collected by Hutchinson and Kennedy (19). More recently, Cooper collected encroachment data from Canadian highways (21). Wolford and Sicking used Cooper's encroachment data and a separate benefit/cost analysis approach to determine optimum guardrail length-of-need (33). The recommended values based upon a B/C analysis match well with those

developed from Cooper's data, both were significantly lower than those shown in the RDG. In order to determine the real appropriateness of each of these three sources of guardrail runout length, required guardrail lengths were compared to those determined from real-world crash data (34) Reconstructions of real-world single vehicle run-off-the-road crashes also matched vehicle runout lengths from Cooper very closely. Thus, runout lengths recommended by Wolford and Sicking were used instead of those suggested by RDG. It is believed that by doing this, more cost-effective guardrail lengths will improve the overall cost effectiveness of guardrail use.

Equation 6.3.2 was used for determination of both upstream and downstream guardrail lengths. The only difference between upstream and downstream calculation is the $L_a$ value. Since the $L_a$ value corresponds to the distance between the traveled way edge and the back of the roadside hazard, one more lane width (12 feet or 3.6 meters), corresponding to the opposing lane, is added to the $L_a$ distance when calculating downstream, or opposing traffic guardrail.

Guardrail end-terminals were also used so that the entire guardrail installation may be set according to current standards. TL-3 guardrail end-terminals are used so that this performance level may match with the performance level of the rest of the guardrail system. Width of 2 feet (0.6 meters) was adopted for guardrail systems. On freeways, guardrail end-terminals are placed on the upstream side of the installation in order to make vehicle impacts safer if guardrail ends are involved in a crash, as shown in Figure 21.

**Figure 21. Upstream side guardrail end-terminal**

### 6.4 Grating

Culvert grates were suggested to treat culvert openings greater than 36 inches (0.9 meters) (39). For these culvert openings, grates were placed on the plane of the sideslope and perpendicular to the traffic flow. Also, as presented in the previous chapter, grate designs have shown to be structurally capable of sustaining passenger cars as well as pickup truck impacts. In addition, it was found that decelerations suffered by vehicle occupants were acceptable and that the roadside terrain appeared to influence the trajectory of the vehicles more than the grates themselves. Thus, grating might be a cost-effective safety measure to treat cross-drainage culverts.

In the present study, grating was defined as the fourth safety treatment. In order to implement this treatment, different procedures were adopted depending upon two circumstances. First, for scenarios with 3:1 or flatter slopes, the only change in the scenario was the placement of grates on top of the culvert opening. Second, for scenarios with slopes steeper than 3:1, the entire slope was flattened to 3:1 and a grate was added to the culvert. This approach was adopted because safety grates have been tested successfully on 3:1 slopes (41) and it is believed that they would not be effective on steeper slopes since rollover propensity on sideslopes steeper than 3:1 is too high.

Crash test has shown that grates do not greatly increase the risk of occupant injury. Thus, the grates were considered to have the same severity as the slope upon which they were installed.

# 7 RESULTS

RSAP was run for every combination of roadway and traffic characteristics shown in Table 6. Accident costs were tabulated for each run and are presented in Appendices III, IV, and V. This chapter is divided in two sub-sections. Section 7.1 describes the main conclusions drawn from accident costs presented in Appendices III, IV, and V. Section 7.2 shows how designers can use the found accident costs to determine the adequate safety treatment for any given project.

## 7.1 Findings

Whenever the direct costs of the various safety treatment options are found to be very similar, the option with the lowest accident cost will provide the most appropriate safety treatment. Further, the safety treatment that produces the lowest accident costs can be considered the safest alternative, regardless of costs. In an effort to help designers better understand the situations where each safety treatment in most likely to be optimal, the following observations were compiled from the accident cost tables in Appendices III, IV, and V.

### 7.1.1 Local Roads

- Grating was found to produce the lowest accident cost on roads with 2:1 sideslopes.
- Culvert extension was found to produce the lowest accident cost on roads with 4:1 sidelopes and average daily traffic volume not lower than 800.

### 7.1.2 Rural Arterial

- Grating was found to produce the lowest accident cost on roads with 2:1 sideslopes.
- Grating was found to produce the lowest accident cost on any straight segment road.
- Culvert extension was found to produce the lowest accident cost on roads with 4:1 sideslopes with an offset distance of 8 feet and average daily traffic volume higher than 1000.

### 7.1.3 Freeway

– Grating did produce the lowest accident cost for all scenarios.

## 7.2 Example Applications

Selection of the most appropriate safety treatment for a roadside cross-drainage culvert should be based upon an incremental benefit/cost analysis. This type of analysis can be conducted using the accident costs tabulated in Appendices III through V and direct costs estimated for each safety treatment at any given site. The following paragraphs illustrated how such an analysis can be conducted.

Assume that the costs to implement culvert extension, guardrail installation, and grating are $15,000, $5,000, and $2,000 respectively. Culvert extension costs should include costs related to materials and services such as fill material and earthwork. Guardrail installation costs are proportional to guardrail length-of-need. Finally, grating costs are expected to be lowest among the three since it involves nothing but the grates themselves.

The direct costs for construction of the safety treatments must then be converted to annualized costs in order to match the accident costs tabulated in Appendices III through V. Direct costs are annualized using the following equation:

$$A = P.\left[\frac{i.(1+i)^n}{(1+i)^n - 1}\right] \tag{7.2.1}$$

where:

A = annual payment required over n years,
P = initial investment required,
i = interest rate, and
n = periods of repayment or project life.

Assume a 4% discount factor of interest rate and a project life of 25 years are used when applying Equation 7.2.1. After being annualized, the direct costs for culvert extension, guardrail installation and grating were estimated to be $960.18, $320.06, and $128.02, respectively.

The incremental benefit-cost ratio for each treatment option can then be calculated using the equation shown below.

$$B/C \text{ Ratio}_{2-1} = \frac{AC_1 - AC_2}{DC_2 - DC_1} \tag{7.2.2}$$

where:

$AC_n$ = Accident cost for safety treatment n, and

$DC_n$ = Direct cost for safety treatment n.

Note that the incremental B/C analysis is easiest to interpret when the treatment options are ordered from the lowest accident cost to highest accident cost. In this example, and most real-world situations, the lowest direct cost option is the do-nothing option. Culvert grates are the second lowest cost and guardrail protection and culvert extension are the third and fourth lowest cost options. First, using Equation 7.2.2, the B/C ratios for constructing culvert grates are calculated as shown below.

$$B/C \text{ Ratio}_{Grating-Do-nothing} = \frac{AC_{Do-nothing} - AC_{Grating}}{DC_{Grating} - DC_{Do-nothing}} = \frac{4,668.98 - 1,769.90}{128.02 - 0} = 22.64$$

Clearly, constructing a culvert grate is cost beneficial since the found B/C ratio is much greater than 1.0. Thus, grating would be recommended over the do-nothing option. Because grating was found to be cost beneficial, the remaining options will be compared to grating. If grating was not found to be cost beneficial, the do-nothing option would be the basis for comparing the remaining alternatives.

The incremental B/C ratio for installing guardrail instead of culvert grating is then calculated using Equation 7.2.2.

$$B/C \text{ Ratio}_{Guardrail-Grating} = \frac{AC_{Grating} - AC_{Guardrail}}{DC_{Guardrail} - DC_{Grating}} = \frac{1,769.90 - 4,061.31}{320.06 - 128.02} = -11.93$$

The B/C ratio is negative which means that accident costs associated with guardrail installation are higher than those associated with grating; therefore, grating is a safer treatment than guardrail installation for this example. Because the B/C ratios of guardrail compared to culvert grates is negative, guardrail installation is not recommended. Thus, culvert grating remains the basis for comparison for the culvert extension option. The incremental B/C ratio for culvert extension compared to grating is then calculated using Equation 7.2.2.

$$B/C \text{ Ratio}_{Extension-Grating} = \frac{AC_{Grating} - AC_{Extension}}{DC_{Extension} - DC_{Grating}} = \frac{1,769.90 - 4,183.04}{960.18 - 128.02} = -2.89$$

The B/C ratio for this option is also negative. Because transportation agencies seek safety treatments which provide B/C ratios higher than 1.0, neither guardrail installation nor culvert extension were found to provide any benefit over grating. On the other hand, grating was found to provide significant benefits over the option of leaving the culvert unprotected.

Most transportation agencies adopt a threshold value for funding safety projects at a B/C ratio of at least 2.0 because of inaccuracies included in the crash cost prediction algorithms. These inaccuracies include crash frequency prediction, crash severity estimation, and accident cost determination as discussed in Section 2.4. Hence, considering that the B/C ratio of 22.64 is much higher than 2.0, grating is the safety treatment that should be chosen for this example.

Using the accident cost tables shown in Appendices III, IV, and V, and the procedure above, designers should be able to quickly determine which of the four possible safety treatments is most cost beneficial.

# 8 SUMMARY AND CONCLUSIONS

The purpose of this study was to develop guidelines on safety treatments for roadside culverts. Guidelines were developed based on accident costs which were associated with various roadway and roadside conditions. These accident costs were estimated by using an encroachment probability model (28). Therefore, it is possible to quantify the benefits derived from the adoption of each safety treatment applied.

The study began with a parametric study which investigated roadway and roadside characteristics that have significant impact on accident cost change. Eleven variables were initially utilized and three of them were found not to impact accident costs much. Thus, these variables were eliminated from further analysis. The remaining variables were used in order to model highway scenarios from three different highway classes. Values were assigned to the variables used based upon highway functional class. Appendix I shows accident cost variations calculated in the parametric study.

Subsequently, procedures were implemented in order to model the adopted safety treatments in the encroachment probability based model. These procedures were implemented based either on information from the RDG or on findings from relevant literature, and they were discussed in chapter 6. Highway scenarios were then modeled for each combination of roadway and roadside variables as well as for each one of the four safety treatments, resulting in over three thousand scenarios.

The accident cost tables shown in Appendices III, IV, and V display accident costs resulting from each safety treatment under different roadway and roadside conditions. These costs can provide guidance on identifying the most appropriate safety treatment for roadside cross-drainage culverts. This data should greatly simplify the process for conducting benefit cost

analysis of various treatment options, thereby facilitating the design of most 3R and similar projects. Further, the simplified procedures should provide improved application of scarce safety funds, thereby improving overall highway safety.

It should be noted that guardrail installation has not been found to be the safety option with the lowest accident cost for any scenario. Even though guardrail protection has been widely used to protect errant drivers from crashing roadside culverts, it is not the safest option under most circumstances. Culvert extension has been found to be the safety option with the lowest accident costs for scenarios with 4:1 sideslopes, average daily traffic not lower than 1000 and slope offset distances not greater than 10 feet. Therefore, culvert extension seems to be the safest treatment for some scenarios with 4:1 sideslopes, This may be attributed to the fact that, for scenarios with such sideslopes, relatively lengthy clear zone distances are required making sideslopes even flatter and culverts farther from the travel way. It should also be noted that a large proportion of the roadside scenarios showed that grating produced the lowest overall cost. Furthermore, grating has been found to be the safest treatment for all freeway scenarios.

These findings indicate that the choice of culvert safety treatments must be flexible to roadway and roadside characteristics, and that the expanded use of culvert extension and grating can produce safer roadsides.

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# APPENDIX I – PARAMETRIC STUDY RESULTS

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| SIDE SLOPE STEEPNESS (H:V) | | | | |
| 2H:1V | 31614.56 | 28015.94 | 24311.19 | 11005.47 |
| 4H:1V | 9764.97 | 6919.98 | 7348.78 | 3523.02 |
| 6H:1V | 5379.83 | 4854.32 | 5320.98 | 870.40 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| AVERAGE DAILY TRAFFIC (No Vehicles / Day) | | | | |
| 950 | 15620.76 | 14704.56 | 12494.03 | 5437.81 |
| 6000 | 27576.76 | 24498.54 | 21402.82 | 9599.86 |
| 12000 | 30703.16 | 25640.77 | 22646.23 | 10688.20 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| TRAFFIC GROWTH FACTOR (%) | | | | |
| 0 | 27300.46 | 22799.11 | 20136.46 | 9503.67 |
| 2 | 30703.16 | 25640.77 | 22646.23 | 10688.20 |
| 4 | 35416.56 | 29577.01 | 26122.78 | 12329.00 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| Lane Width (ft) | | | | |
| 10 | 32252.53 | 26964.24 | 23819.72 | 11223.29 |
| 11 | 31459.14 | 26258.32 | 23187.29 | 10951.61 |
| 12 | 30703.16 | 25640.77 | 22646.23 | 10688.20 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| NUMBER OF LANES (Und) | | | | |
| 2 | 27576.76 | 24498.54 | 21402.82 | 9599.86 |
| 6 | 36853.62 | 34279.32 | 30840.08 | 12947.80 |
| 10 | 42259.83 | 37988.50 | 35898.75 | 14731.21 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| SLOPE OFFSET(ft) | | | | |
| 6 | 40388.27 | 35177.46 | 30621.60 | 14073.14 |
| 10 | 31614.56 | 28122.63 | 24536.63 | 11005.47 |
| 14 | 24159.50 | 22676.80 | 19071.88 | 8401.34 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| CULVERT OFFSET (ft) | | | | |
| 14 | 31614.56 | 28122.63 | 24536.63 | 11005.47 |
| 16 | 31766.35 | 28531.92 | 24616.06 | 11022.43 |
| 18 | 31885.65 | 25646.36 | 24704.44 | 11033.61 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| SLOPE DEPTH (ft) | | | | |
| 10 | 31614.56 | 28122.63 | 24536.63 | 11005.47 |
| 11 | 31766.35 | 28531.92 | 24616.06 | 11022.43 |
| 12 | 31885.65 | 25646.36 | 24704.44 | 11033.61 |
| 14 | 32004.74 | 28388.42 | 24741.37 | 11044.66 |
| 20 | 30931.70 | 28481.02 | 24420.54 | 11551.49 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| HORIZONTAL RADIUS (ft) | | | | |
| 1080 | 72526.52 | 62467.77 | 58188.34 | 26327.16 |
| 1295 | 63027.95 | 53883.22 | 48574.15 | 22734.40 |
| 1600 | 46127.84 | 40096.29 | 35537.83 | 16672.03 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| CULVERT TYPE | | | | |
| Rounded pipe culvert | 29307.74 | 26834.40 | 23632.11 | 11005.47 |
| Rounded pipe culvert with concrete Rip-rap | 29388.99 | 27124.60 | 23680.90 | 11005.47 |
| Vertical end culvert | 33348.05 | 29208.16 | 25192.95 | 11005.47 |
| Single box culvert | 30511.66 | 27526.15 | 24124.04 | 11005.47 |
| Flared wing wall culvert | 31614.56 | 28122.63 | 24536.63 | 11005.47 |

| | ACCIDENT COSTS ($) | | | |
|---|---|---|---|---|
| | Do-nothing | Culvert extension | Guardrail installation | Grating |
| Culvert Size (ft) | | | | |
| 4x6 | 25744.10 | 23472.51 | 21247.93 | 9690.47 |
| 8x10 | 31614.56 | 28087.38 | 24536.63 | 11005.47 |
| 10x12 | 29437.11 | 27985.5 | 23527.04 | 11033.61 |

## APPENDIX II – THE LOWEST ACCIDENT COST SAFETY TREATMENTS

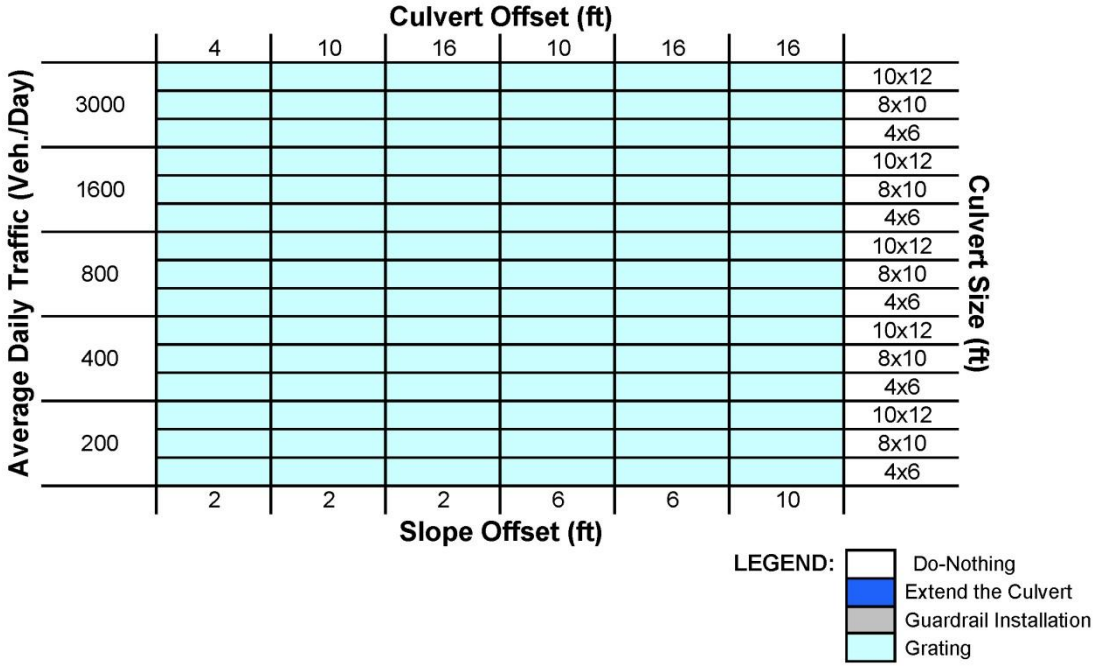


**Figure 22. Results from the local road with 2 on 1 side slopes**

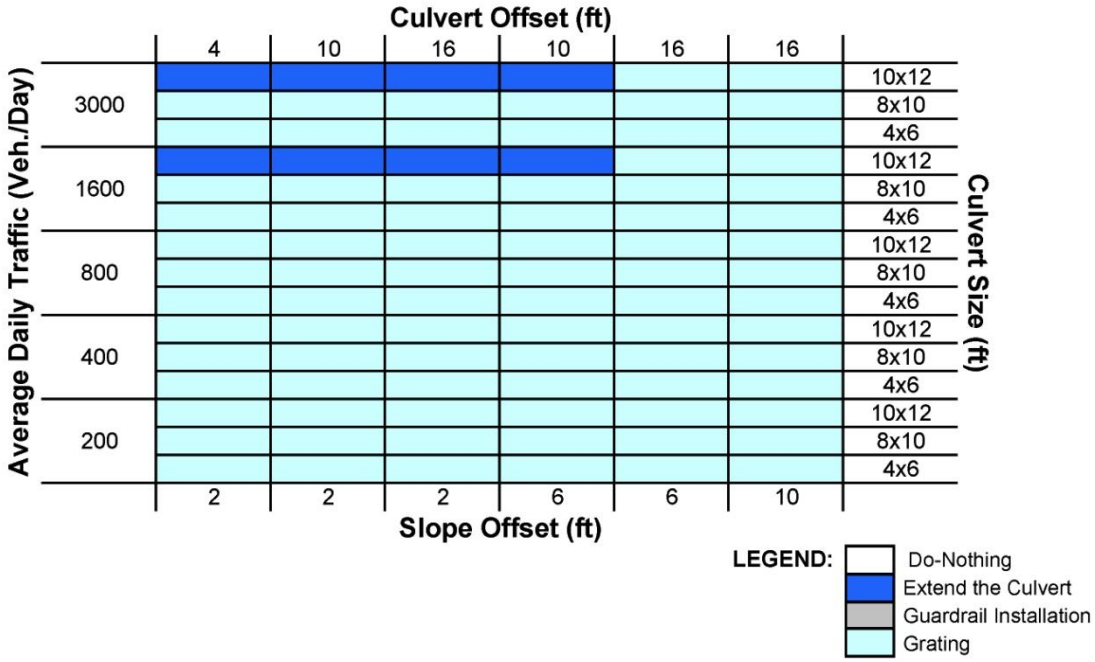


**Figure 23. Results from the local road with traffic growth factor of 0% per year, straight segment, and 4 on 1 side slope**

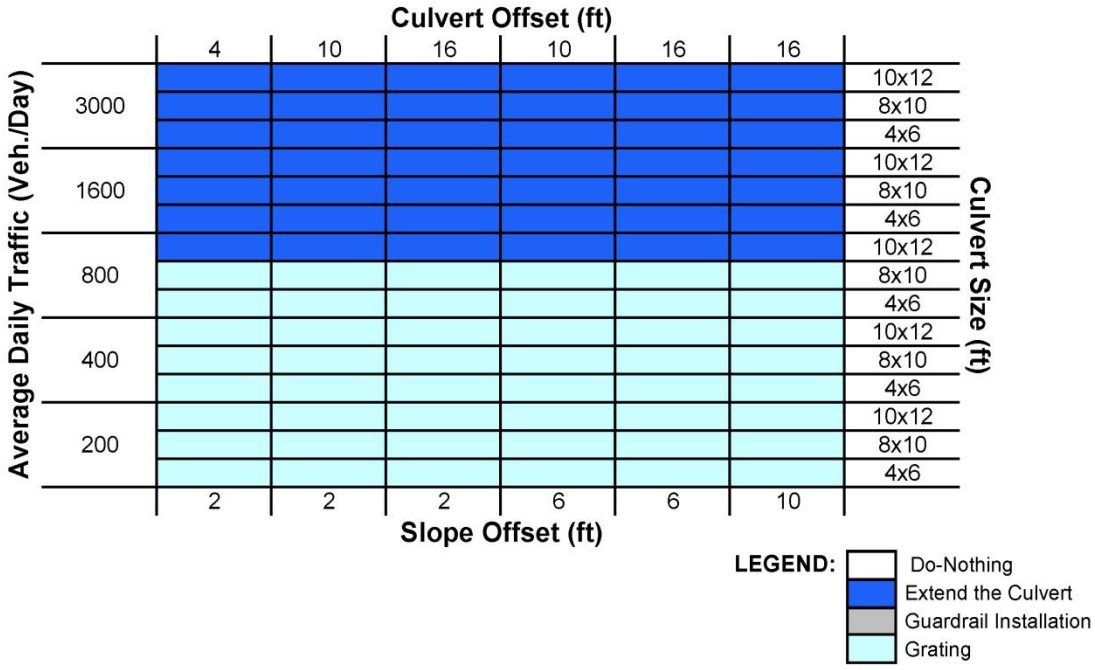


**Figure 24. Results from the local road for all other cases**

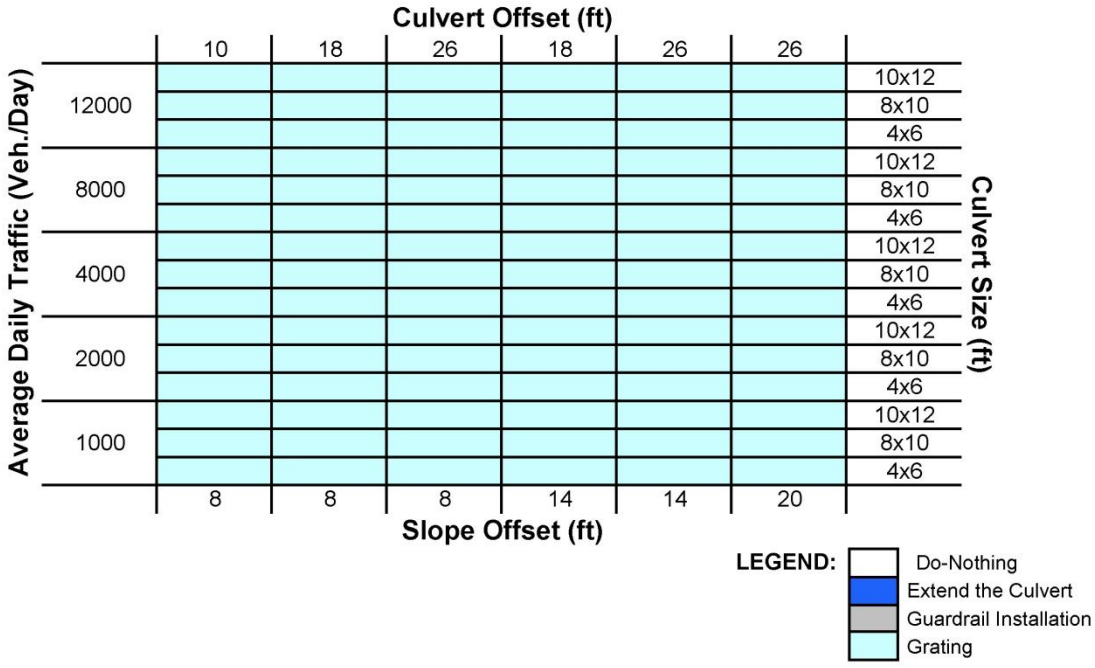


**Figure 25. Results from the rural arterial highway with 2 on 1 side slopes**

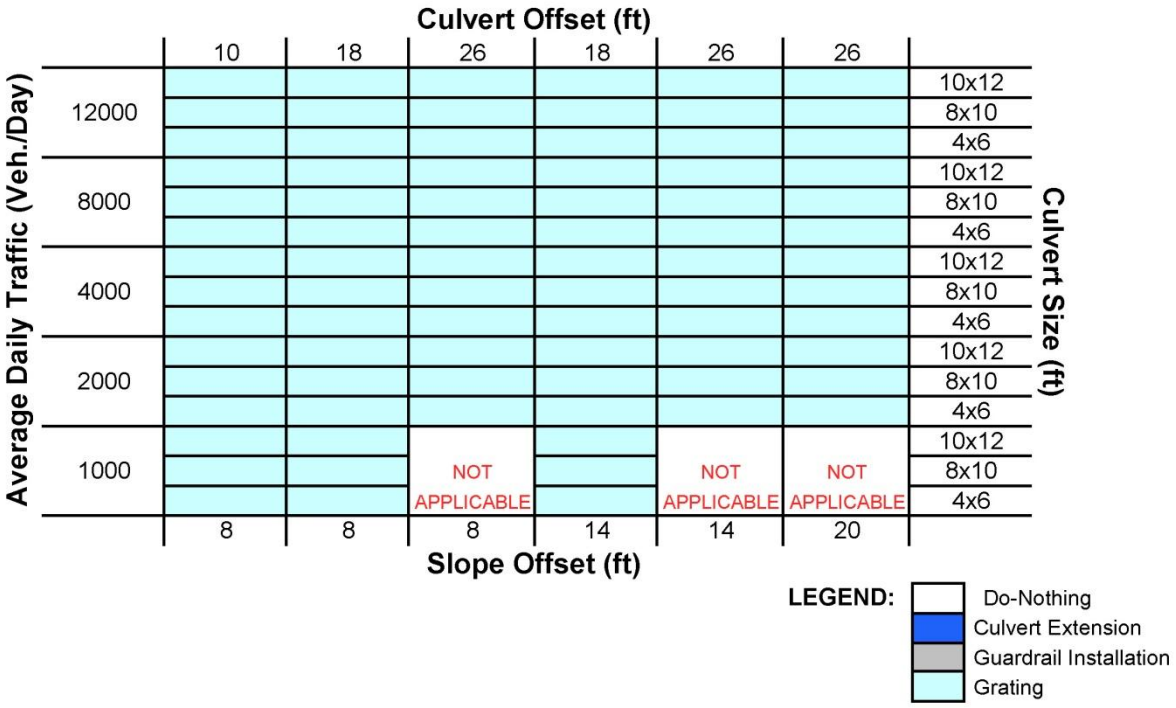


**Figure 26. Results from the rural arterial highway with straight segments and 4 on 1 side slopes**

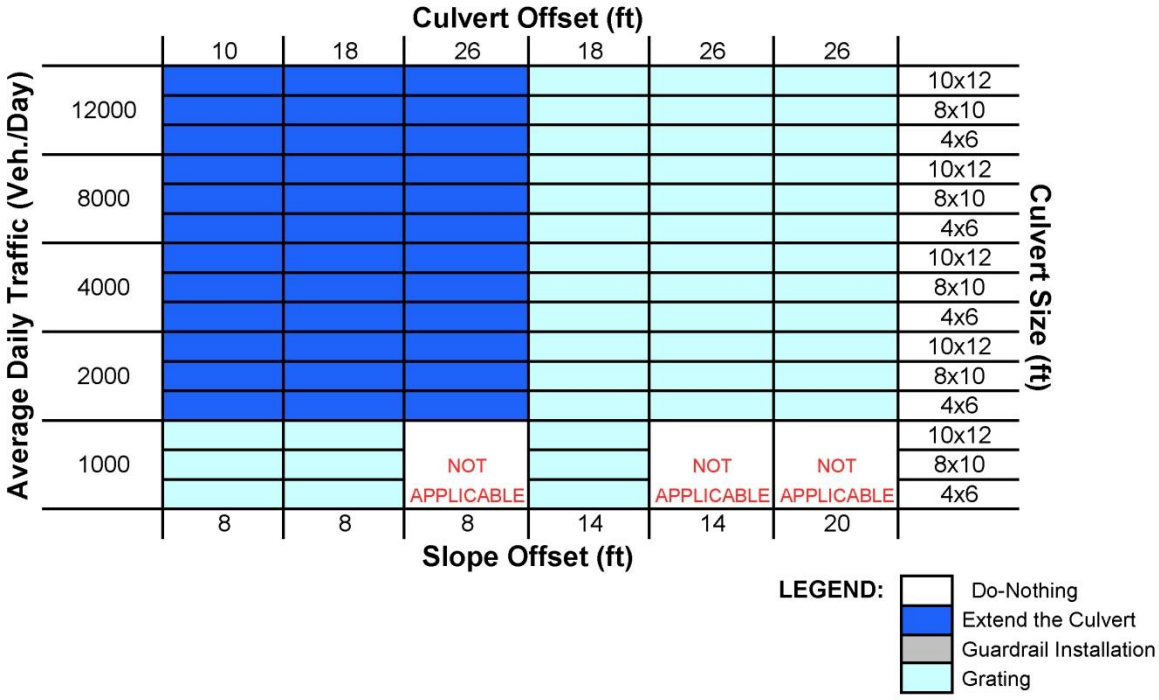


**Figure 27. Results from the rural arterial highway with curved segments and 4 on 1 side slopes**

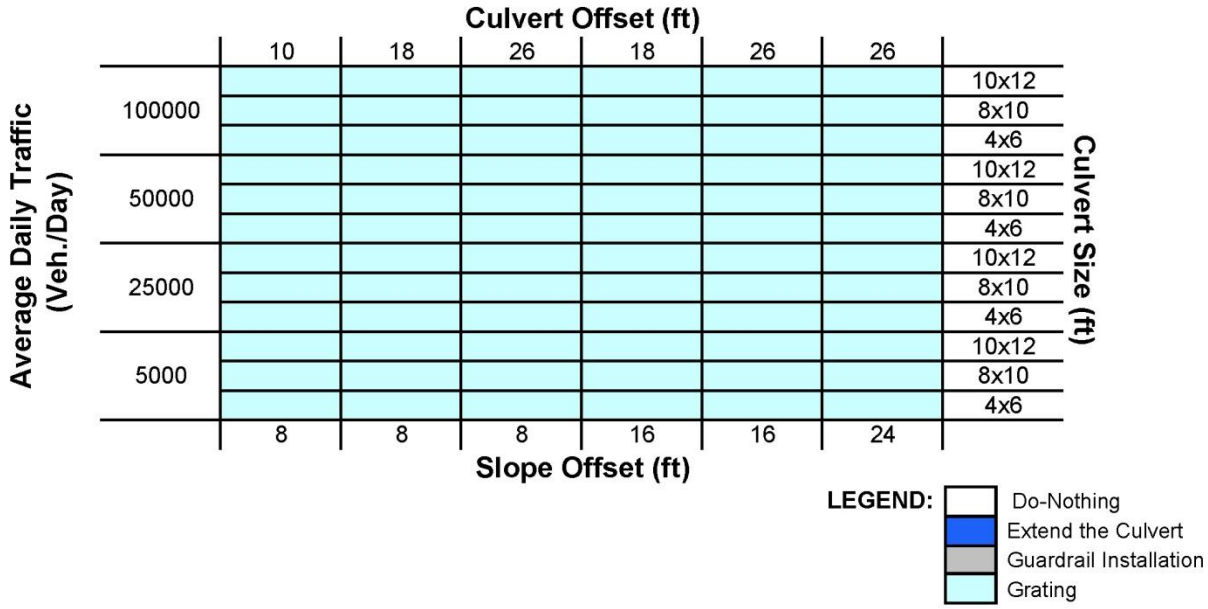


**Figure 28. Results from the freeway for any highway scenario**

# APPENDIX III – LOCAL ROAD ACCIDENT COST COMPILATION

| **Scen.** No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | **Culvert** Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | **4** | 5 | 4668.98 | 4183.04 | 4061.31 | 1769.9 |
| 2 | | | | | | 2 | 10 | 8 | 4772.56 | 4251.97 | 4133.43 | 1797.76 |
| 3 | | | | | | | 16 | 11 | 5501.96 | 4826.91 | 4703.38 | 2031.47 |
| 4 | | | | | 2 on 1 | | 10 | 6 | 3751.07 | 3661.16 | 3326.79 | 1417.36 |
| 5 | | | | | | 6 | 16 | 9 | 3819.43 | 3526.91 | 3366.33 | 1413.33 |
| 6 | | | | 4x6 | | 10 | 16 | 7 | 2956.66 | 2867.41 | 2658.04 | 1111.86 |
| 7 | | | | | | | 4 | 4.5 | 1184.52 | 851.6 | 1236.84 | 631.5 |
| 8 | | | | | | 2 | 10 | 6 | 1137.14 | 925.77 | 1018.04 | 637.5 |
| 9 | | | | | 4 on 1 | | 16 | 7.5 | 1087.05 | 884.83 | 1055.77 | 640.68 |
| 10 | | | | | | | 10 | 5 | 930.63 | 796.78 | 784.44 | 503.96 |
| 11 | | | | | | 6 | 16 | 6.5 | 892.24 | 715.54 | 820.42 | 507.14 |
| 12 | | | | | | 10 | 16 | 5.5 | 722.05 | 605.15 | 623.52 | 394.65 |
| 13 | | | | | | | 4 | 9 | 5137.58 | 4358.89 | 4231.39 | 1803.16 |
| 14 | 200 | 0 | 0 | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 15 | | | | | | | 16 | 15 | 5895.64 | 5071.64 | 4885.38 | 2038.57 |
| 16 | | | | | 2 on 1 | | 10 | 10 | 4609.12 | 4345.22 | 3872.13 | 1609.85 |
| 17 | | | | | | 6 | 16 | 13 | 4655.23 | 4283.97 | 3926.31 | 1615.64 |
| 18 | | | | 8x10 | | 10 | 16 | 11 | 3608.18 | 3494.59 | 3086.37 | 1258.71 |
| 19 | | | | | | | 4 | 8.5 | 1765.96 | 1185.2 | 4502.38 | 642.19 |
| 20 | | | | | | 2 | 10 | 10 | 1616.6 | 1240.18 | 1310.21 | 643.66 |
| 21 | | | | | 4 on 1 | | 16 | 11.5 | 1476.68 | 1135.72 | 1298.13 | 644.31 |
| 22 | | | | | | | 10 | 9 | 1345.16 | 1089.95 | 1025.23 | 510.12 |
| 23 | | | | | | 6 | 16 | 10.5 | 1225.79 | 928.24 | 1029.8 | 510.77 |
| 24 | | | | | | 10 | 16 | 9.5 | 882.16 | 814.02 | 786.75 | 398.28 |
| 25 | | | | | | | 4 | 11 | 5468.31 | 5050.69 | 4744.79 | 2031.47 |
| 26 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 5501.87 | 4087.71 | 4674.55 | 2037.79 |
| 27 | | | | | | | 16 | 17 | 5781.8 | 5066.7 | 4882.53 | 2133.71 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | 10 | 12 | 4353.75 | 4326.99 | 3784.97 | 1614.48 |
| 29 | | | | | 2 on 1 | 6 | 16 | 15 | 4373.22 | 4234.79 | 3776.86 | 1617.21 |
| 30 | | | | | | 10 | 16 | 13 | 3403.61 | 3450.53 | 2985.31 | 1260.6 |
| 31 | | | | | | | 4 | 10.5 | 1086.29 | 796.36 | 1305.66 | 643.89 |
| 32 | | | 0 | 10x12 | | 2 | 10 | 12 | 1016.07 | 822.28 | 978.22 | 644.42 |
| 33 | | | | | 4 on 1 | | 16 | 13.5 | 952.15 | 760.9 | 964.43 | 644.68 |
| 34 | | | | | | | 10 | 11 | 833.76 | 711.65 | 773.7 | 510.88 |
| 35 | | | | | | 6 | 16 | 12.5 | 778.93 | 610.41 | 768.49 | 511.14 |
| 36 | | | | | | 10 | 16 | 11.5 | 629.62 | 539.46 | 291.88 | 398.65 |
| 37 | | | | | | | 4 | 5 | 12046.98 | 10433.92 | 10818.04 | 4575.83 |
| 38 | | | | | | 2 | 10 | 8 | 12221.29 | 10056.67 | 10875.54 | 4619.38 |
| 39 | | | | | | | 16 | 11 | 14124.67 | 11394.87 | 12235.17 | 5210.32 |
| 40 | | | | | 2 on 1 | | 10 | 6 | 9481.36 | 9104.04 | 8608.96 | 3589.66 |
| 41 | | | | | | 6 | 16 | 9 | 9568.44 | 8579.13 | 8668.17 | 3616.73 |
| 42 | 200 | 0 | | 4x6 | | 10 | 16 | 7 | 2621.78 | 1749.3 | 3655.29 | 1629.44 |
| 43 | | | | | | | 4 | 4.5 | 7333.97 | 6988.19 | 6737.55 | 2773.74 |
| 44 | | | | | | 2 | 10 | 6 | 2386.74 | 1872.68 | 2344.44 | 1637.61 |
| 45 | | | 5 | | 4 on 1 | | 16 | 7.5 | 2212.52 | 1710.91 | 2427.18 | 1643.2 |
| 46 | | | | | | | 10 | 5 | 1923.66 | 1576.08 | 1783.09 | 1274.79 |
| 47 | | | | | | 6 | 16 | 6.5 | 1765.96 | 1276.69 | 1774.2 | 1280.11 |
| 48 | | | | | | 10 | 16 | 5.5 | 1399.22 | 1161.28 | 1342.35 | 983.76 |
| 49 | | | | | | | 4 | 9 | 12881.55 | 10798.91 | 10984.6 | 4627.43 |
| 50 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 2079.06 | 2576.78 |
| 51 | | | | | | | 16 | 15 | 14633.43 | 11694.37 | 12296.57 | 5221.97 |
| 52 | | | | | 1 on 2 | | 10 | 10 | 11382.67 | 10583.02 | 9774.99 | 4062.47 |
| 53 | | | | | | 6 | 16 | 13 | 11373.81 | 10121.97 | 9760.13 | 4072.11 |
| 54 | | | | 8 x 10 | | 10 | 16 | 11 | 8727.92 | 8260.12 | 7639.51 | 3132.57 |
| 55 | | | | | | | 4 | 8.5 | 3543.64 | 2124.22 | 11232.96 | 1646.35 |
| 56 | | | | | 4 on 1 | 2 | 10 | 10 | 3115.57 | 2305.66 | 2672.47 | 1648.56 |
| 57 | | | | | | | 16 | 11.5 | 2787.14 | 2110.21 | 2608.34 | 1649.9 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 | | | | | | | 10 | 9 | 2537.94 | 1969.37 | 2080.09 | 1285.46 |
| 59 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 2245.36 | 1550.45 | 2021.32 | 1286.8 |
| 60 | | | | | | 10 | 16 | 9.5 | 1628.05 | 1438.66 | 1536.1 | 990.4 |
| 61 | | | | | | | 4 | 11 | 14081.54 | 12519.19 | 12526.34 | 5210.32 |
| 62 | | | | | | 2 | 10 | 14 | 14135.58 | 9866.64 | 12162.31 | 5220.41 |
| 63 | | | | | 2 on 1 | | 16 | 17 | 14860.05 | 12284.06 | 12598.6 | 5463.93 |
| 64 | | | | | | | 10 | 12 | 11009.21 | 10366.03 | 9724.38 | 4069.38 |
| 65 | | | | | | 6 | 16 | 15 | 11048.36 | 9998 | 9629.63 | 4074.41 |
| 66 | | | 5 | 10 x 12 | | 10 | 16 | 13 | 8498.47 | 8330.64 | 7576.86 | 3135.86 |
| 67 | | | | | | | 4 | 10.5 | 2382.01 | 1681.95 | 3853.27 | 1649.12 |
| 68 | | | | | | 2 | 10 | 12 | 2209.24 | 1816.73 | 2355.8 | 1650.07 |
| 69 | | | | | 4 on 1 | | 16 | 13.5 | 2069.36 | 1634.29 | 2323.33 | 1650.43 |
| 70 | | | | | | | 10 | 11 | 1770.74 | 1506.99 | 1823.85 | 1286.97 |
| 71 | | | | | | 6 | 16 | 12.5 | 1644.59 | 1251.43 | 1795.57 | 1287.3 |
| 72 | 200 | 0 | | | | 10 | 16 | 11.5 | 1297.14 | 1123.96 | 1368.54 | 990.89 |
| 73 | | | | | | | 4 | 5 | 10360.17 | 8907.44 | 10250.55 | 3906.96 |
| 74 | | | | | | 2 | 10 | 8 | 10446.01 | 8517.48 | 10409.39 | 3938.86 |
| 75 | | | | | | | 16 | 11 | 12027.12 | 9754.26 | 11586.04 | 4434.22 |
| 76 | | | | | 2 on 1 | | 10 | 6 | 8063.03 | 7655.73 | 7911.12 | 3045.49 |
| 77 | | | | | | 6 | 16 | 9 | 8122.15 | 7181.25 | 7960.51 | 3061.01 |
| 78 | | | 10 | 4x6 | | 10 | 16 | 7 | 6142.4 | 5806.82 | 6047.09 | 2318.13 |
| 79 | | | | | | | 4 | 4.5 | 2304.12 | 145.36 | 4303.51 | 1388.99 |
| 80 | | | | | | 2 | 10 | 6 | 2091.01 | 1545.39 | 2648.89 | 1396.28 |
| 81 | | | | | 4 on 1 | | 16 | 7.5 | 1883.92 | 1405.07 | 2712.46 | 1399.45 |
| 82 | | | | | | | 10 | 5 | 1682.61 | 1292.55 | 1988.53 | 1081.93 |
| 83 | | | | | | 6 | 16 | 6.5 | 1499.51 | 1019.59 | 1933.75 | 1085.08 |
| 84 | | | | | | 10 | 16 | 5.5 | 1176.47 | 937.41 | 1406.54 | 822.65 |
| 85 | | | | | | | 4 | 9 | 10999.68 | 9093.24 | 10441.15 | 3943.54 |
| 86 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 87 | | | | | | | 16 | 15 | 12458.54 | 9943.51 | 11601.14 | 4442.78 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88 | | | | | | | 10 | 10 | 9651.28 | 8753.76 | 8957.33 | 3439.48 |
| 89 | | | | | 2 on 1 | 6 | 16 | 13 | 9634.14 | 8385.16 | 8948.51 | 3445.73 |
| 90 | | | | | | 10 | 16 | 11 | 7292.94 | 6860.58 | 6813.85 | 2614.09 |
| 91 | | | | | | | 4 | 8.5 | 2932.89 | 1618.61 | 10457.82 | 1401.09 |
| 92 | | | | 8x10 | | 2 | 10 | 10 | 2564.65 | 1763.86 | 2899.18 | 1402.7 |
| 93 | | | | | 4 on 1 | | 16 | 11.5 | 2252.62 | 1629.06 | 2765.86 | 1403.54 |
| 94 | | | | | | | 10 | 9 | 2081.5 | 1496.31 | 2197.9 | 1088.23 |
| 95 | | | | | | 6 | 16 | 10.5 | 1357.43 | 1067.82 | 1536.75 | 826.4 |
| 96 | | | | | | 10 | 16 | 9.5 | 12012.59 | 10371.36 | 11655.62 | 4434.22 |
| 97 | | 0 | 10 | | | | 4 | 11 | 12049.54 | 8189.57 | 11511.94 | 4441.62 |
| 98 | | | | | | 2 | 10 | 14 | 12659.39 | 10293.5 | 11861.78 | 4647.97 |
| 99 | | | | | 2 on 1 | | 16 | 17 | 9331.74 | 8709.83 | 8895.79 | 3444.57 |
| 100 | | | | | | | 10 | 12 | 9353.63 | 8317.46 | 8859.07 | 3447.5 |
| 101 | | | | | | 6 | 16 | 15 | 7094.86 | 6829.92 | 6822.98 | 2615.99 |
| 102 | 200 | | | 10x12 | | 10 | 16 | 13 | 2002.52 | 1349.82 | 4523.59 | 1402.97 |
| 103 | | | | | | | 4 | 10.5 | 1840.27 | 1458.4 | 2640.23 | 1403.68 |
| 104 | | | | | | 2 | 10 | 12 | 1715.21 | 1336.91 | 2584.65 | 1403.87 |
| 105 | | | | | 4 on 1 | | 16 | 13.5 | 1468.33 | 1194.37 | 2012.66 | 1089.1 |
| 106 | | | | | | | 10 | 11 | 1357.03 | 993.08 | 1974.28 | 1089.28 |
| 107 | | | | | | 6 | 16 | 12.5 | 1056.4 | 871.48 | 1463.14 | 826.73 |
| 108 | | | | | | 10 | 16 | 11.5 | 1806.5 | 1125.4 | 2114.35 | 1088.95 |
| 109 | | | | | | | 4 | 5 | 7040.76 | 6307.96 | 6124.4 | 2668.99 |
| 110 | | | | | | 2 | 10 | 8 | 7196.96 | 6411.92 | 6233.16 | 2711 |
| 111 | | | | | | | 16 | 11 | 8296.89 | 7278.92 | 7092.63 | 3063.43 |
| 112 | | | | | 2 on 1 | | 10 | 6 | 5656.57 | 5520.99 | 5016.75 | 2137.37 |
| 113 | | 3 | 0 | 4x6 | | 6 | 16 | 9 | 5759.66 | 5318.53 | 5076.39 | 2158.42 |
| 114 | | | | | | 10 | 16 | 7 | 4458.61 | 4324.02 | 4008.28 | 1676.67 |
| 115 | | | | | | | 4 | 4.5 | 1786.24 | 1284.21 | 1865.14 | 952.29 |
| 116 | | | | | 4 on 1 | 2 | 10 | 6 | 1714.79 | 1396.04 | 1535.2 | 961.34 |
| 117 | | | | | | | 16 | 7.5 | 1639.26 | 1334.31 | 1592.09 | 966.13 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | | | | | | | 10 | 5 | 1403.37 | 1201.54 | 1182.92 | 759.97 |
| 119 | | | | 4x6 | 4 on 1 | 6 | 16 | 6.5 | 1345.48 | 1079.02 | 1237.18 | 764.77 |
| 120 | | | | | | 10 | 16 | 5.5 | 1088.84 | 912.56 | 940.26 | 595.12 |
| 121 | | | | | | | 4 | 9 | 7747.4 | 6844.58 | 6830.88 | 2719.15 |
| 122 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 123 | | | | | | | 16 | 15 | 8890.54 | 7647.96 | 7367.09 | 3074.14 |
| 124 | | | | | 2 on 1 | | 10 | 10 | 6950.49 | 6552.54 | 5839.13 | 2427.63 |
| 125 | | | | | | 6 | 16 | 13 | 7020.02 | 6460.17 | 5920.83 | 2436.36 |
| 126 | | | | 8x10 | | 10 | 16 | 11 | 5441.09 | 5269.79 | 4654.21 | 1898.12 |
| 127 | | | | | | | 4 | 8.5 | 2663.04 | 1787.27 | 6789.52 | 968.42 |
| 128 | | | | | | 2 | 10 | 10 | 2437.81 | 1870.18 | 1975.78 | 970.63 |
| 129 | | | | | 4 on 1 | | 16 | 11.5 | 2226.82 | 1712.65 | 1957.57 | 971.6 |
| 130 | | | | | | | 10 | 9 | 2028.48 | 1643.63 | 1546.03 | 769.26 |
| 131 | | | | | | 6 | 16 | 10.5 | 1330.29 | 1227.54 | 1186.4 | 600.59 |
| 132 | 200 | 3 | 0 | | | 10 | 16 | 9.5 | 8246.14 | 7616.38 | 7155.09 | 3063.43 |
| 133 | | | | | | | 4 | 11 | 8296.75 | 6164.21 | 7049.15 | 3072.96 |
| 134 | | | | | | 2 | 10 | 14 | 8718.87 | 7640.51 | 7362.8 | 3217.6 |
| 135 | | | | | 2 on 1 | | 16 | 17 | 6565.39 | 6525.04 | 5707.69 | 2434.62 |
| 136 | | | | | | | 10 | 12 | 6594.76 | 6386.01 | 5695.46 | 2438.73 |
| 137 | | | | | | 6 | 16 | 15 | 5132.6 | 5203.35 | 4501.81 | 1900.97 |
| 138 | | | | 10x12 | | 10 | 16 | 13 | 1638.11 | 1200.91 | 1968.92 | 970.98 |
| 139 | | | | | | | 4 | 10.5 | 1532.22 | 1239.99 | 1475.15 | 971.77 |
| 140 | | | | | | 2 | 10 | 12 | 1435.83 | 1147.42 | 1454.34 | 972.16 |
| 141 | | | | | 4 on 1 | | 16 | 13.5 | 1257.3 | 1073.16 | 1166.72 | 770.4 |
| 142 | | | | | | | 10 | 11 | 1174.61 | 920.49 | 1158.88 | 770.79 |
| 143 | | | | | | 6 | 16 | 12.5 | 949.45 | 813.45 | 892.55 | 601.15 |
| 144 | | | | | | 10 | 16 | 11.5 | 1848.48 | 1399.78 | 1552.93 | 770.23 |
| 145 | | | | | | | 4 | 5 | 18166.69 | 15734.21 | 16313.47 | 6900.3 |
| 146 | | | 5 | 4x6 | 2 on 1 | 2 | 10 | 8 | 18429.54 | 15162.32 | 16400.16 | 6965.97 |
| 147 | | | | | | | 16 | 11 | 21299.81 | 17183.31 | 18450.48 | 7857.09 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 148 | | | | | | | 10 | 6 | 14297.77 | 13728.77 | 12982.2 | 5413.15 |
| 149 | | | | | 2 on 1 | 6 | 16 | 9 | 14429.07 | 12937.21 | 13071.49 | 5449.46 |
| 150 | | | | | | 10 | 16 | 7 | 11059.52 | 10538.09 | 10160.14 | 4182.76 |
| 151 | | | | | | | 4 | 4.5 | 3953.61 | 2637.92 | 5512.13 | 2457.18 |
| 152 | | | | 4x6 | | 2 | 10 | 6 | 3599.17 | 2823.98 | 3535.39 | 2469.49 |
| 153 | | | | | 4 on 1 | | 16 | 7.5 | 3336.45 | 2580.04 | 3660.15 | 2477.92 |
| 154 | | | | | | | 10 | 5 | 2900.85 | 2376.71 | 2688.87 | 1922.37 |
| 155 | | | | | | 6 | 16 | 6.5 | 2663.04 | 1925.23 | 2675.47 | 1930.39 |
| 156 | | | | | | 10 | 16 | 5.5 | 2110.01 | 1751.19 | 2024.25 | 1483.5 |
| 157 | | | | | | | 4 | 9 | 19425.21 | 16284.61 | 16564.63 | 6978.1 |
| 158 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 159 | | | | | | | 16 | 15 | 22067.01 | 17634.96 | 18543.06 | 7874.67 |
| 160 | | | | | 2 on 1 | | 10 | 10 | 17164.91 | 15959.05 | 14740.56 | 6126.16 |
| 161 | | | | | | 6 | 16 | 13 | 17151.55 | 15263.79 | 14718.14 | 6140.69 |
| 162 | 200 | 3 | 5 | 8 x 10 | | 10 | 16 | 11 | 13161.59 | 12456.14 | 11520.29 | 4723.87 |
| 163 | | | | | | | 4 | 8.5 | 5343.76 | 3203.3 | 16939.16 | 2482.68 |
| 164 | | | | | | 2 | 10 | 10 | 4698.25 | 3476.91 | 4030.04 | 2486 |
| 165 | | | | | 4 on 1 | | 16 | 11.5 | 4202.97 | 3182.17 | 3933.35 | 2488.03 |
| 166 | | | | | | | 10 | 9 | 3827.18 | 2969.78 | 3136.74 | 1938.46 |
| 167 | | | | | | 6 | 16 | 10.5 | 2455.07 | 2169.47 | 2316.43 | 1493.5 |
| 168 | | | | | | 10 | 16 | 9.5 | 21263.78 | 18878.77 | 18889.55 | 7857.09 |
| 169 | | | | | | | 4 | 11 | 21316.26 | 14878.76 | 18340.6 | 7872.32 |
| 170 | | | | | | 2 | 10 | 14 | 22408.76 | 18524.2 | 18998.52 | 8239.53 |
| 171 | | | | | 2 on 1 | | 16 | 17 | 16601.74 | 15631.84 | 14664.24 | 6136.57 |
| 172 | | | | 10 x 12 | | | 10 | 12 | 16660.78 | 15076.85 | 14521.36 | 6144.15 |
| 173 | | | | | | 6 | 16 | 15 | 12815.59 | 12562.49 | 11425.8 | 4728.84 |
| 174 | | | | | | 10 | 16 | 13 | 3592.03 | 2536.35 | 5810.68 | 2486.85 |
| 175 | | | | | | | 4 | 10.5 | 3331.5 | 2739.6 | 3552.51 | 2488.28 |
| 176 | | | | | 4 on 1 | 2 | 10 | 12 | 3120.57 | 2464.49 | 3503.56 | 2488.83 |
| 177 | | | | | | | 16 | 13.5 | 2670.26 | 2272.53 | 2750.35 | 1940.73 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 178 | | | | | | | 10 | 11 | 2480.01 | 1887.14 | 2707.7 | 1941.23 |
| 179 | | | 5 | 10x12 | 4 on 1 | 6 | 16 | 12.5 | 1956.07 | 1694.92 | 2063.74 | 1494.25 |
| 180 | | | | | | 10 | 16 | 11.5 | 3385.98 | 2338.06 | 3048.13 | 1940.48 |
| 181 | | | | | | | 4 | 5 | 15623.01 | 13432.3 | 15457.7 | 5891.65 |
| 182 | | | | | | 2 | 10 | 8 | 15752.45 | 12844.25 | 15697.23 | 5939.75 |
| 183 | | | | | | | 16 | 11 | 18136.74 | 14709.3 | 17471.6 | 6686.75 |
| 184 | | | | | 2 on 1 | | 10 | 6 | 12158.95 | 11544.74 | 11929.86 | 4592.56 |
| 185 | | | | | | 6 | 16 | 9 | 12248.1 | 10829.24 | 12004.35 | 4615.96 |
| 186 | | | | 4x6 | | 10 | 16 | 7 | 9262.67 | 8756.61 | 9118.93 | 3495.71 |
| 187 | | | | | | | 4 | 4.5 | 3474.58 | 2190.14 | 6489.63 | 2094.58 |
| 188 | | | | | | 2 | 10 | 6 | 3153.21 | 2330.43 | 3994.49 | 2105.57 |
| 189 | | | | | 4 on 1 | | 16 | 7.5 | 2840.92 | 2118.82 | 4090.35 | 2110.35 |
| 190 | | | | | | | 10 | 5 | 2537.36 | 1949.15 | 2998.68 | 1631.54 |
| 191 | | | | | | 6 | 16 | 6.5 | 2261.24 | 1537.53 | 2916.07 | 1636.29 |
| 192 | | | | | | 10 | 16 | 5.5 | 1774.11 | 1413.61 | 2121.04 | 1240.54 |
| 193 | | | | | | | 4 | 9 | 16587.37 | 13712.48 | 15743.61 | 5946.8 |
| 194 | 200 | 3 | 10 | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 195 | | | | | | | 16 | 15 | 18787.31 | 14994.68 | 17494.36 | 6699.66 |
| 196 | | | | | 2 on 1 | | 10 | 10 | 14554 | 13200.55 | 13507.54 | 5186.69 |
| 197 | | | | | | 6 | 16 | 13 | 14528.16 | 12644.7 | 13494.24 | 5196.12 |
| 198 | | | | 8x10 | | 10 | 16 | 11 | 10997.66 | 10345.66 | 10275.2 | 3942.01 |
| 199 | | | | | | | 4 | 8.5 | 4422.75 | 2440.84 | 15770.25 | 2112.82 |
| 200 | | | | | | 2 | 10 | 10 | 3867.46 | 2659.88 | 4371.92 | 2115.25 |
| 201 | | | | | 4 on 1 | | 16 | 11.5 | 3396.92 | 2456.6 | 4170.89 | 2116.52 |
| 202 | | | | | | | 10 | 9 | 3138.87 | 2256.41 | 3314.4 | 1641.01 |
| 203 | | | | | | 6 | 16 | 10.5 | 2046.98 | 1610.26 | 2317.39 | 1246.21 |
| 204 | | | | | | 10 | 16 | 9.5 | 18114.83 | 15639.88 | 17576.53 | 6686.75 |
| 205 | | | | | | | 4 | 11 | 18170.55 | 12349.77 | 17359385 | 6697.9 |
| 206 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 19090.2 | 15522.47 | 17887.41 | 7009.08 |
| 207 | | | | | | | 16 | 17 | 14072.13 | 13134.31 | 13414.74 | 5194.37 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | | | | | | | 10 | 12 | 14105.16 | 12542.62 | 13359.36 | 5198.78 |
| 209 | | | | | 2 on 1 | 6 | 16 | 15 | 10698.96 | 10299.43 | 10288.97 | 3944.88 |
| 210 | | | | | | 10 | 16 | 13 | 3019.77 | 2035.51 | 6821.51 | 2115.66 |
| 211 | | | | | | | 4 | 10.5 | 2775.1 | 2199.24 | 3981.44 | 2116.73 |
| 212 | 200 | 3 | 10 | 10x12 | | 2 | 10 | 12 | 2586.52 | 2016.04 | 3897.61 | 2117.01 |
| 213 | | | | | 4 on 1 | | 16 | 13.5 | 2214.23 | 1801.09 | 3035.07 | 1642.34 |
| 214 | | | | | | | 10 | 11 | 2046.39 | 1497.56 | 2977.19 | 1642.62 |
| 215 | | | | | | 6 | 16 | 12.5 | 1593.03 | 1314.18 | 2206.4 | 1246.7 |
| 216 | | | | | | 10 | 16 | 11.5 | 2724.18 | 1697.08 | 3188.41 | 1642.13 |
| 217 | | | | | | | 4 | 5 | 9337.95 | 8366.07 | 8122.62 | 3539.8 |
| 218 | | | | | | 2 | 10 | 8 | 9545.13 | 8503.95 | 8266.87 | 3595.52 |
| 219 | | | | | | | 16 | 11 | 11003.93 | 9653.82 | 9406.765 | 4062.94 |
| 220 | | | | | 2 on 1 | | 10 | 6 | 7502.15 | 7322.33 | 6653.57 | 2834.73 |
| 221 | | | | | | 6 | 16 | 9 | 7638.87 | 7053.82 | 6732.67 | 2862.66 |
| 222 | | | | 4x6 | | 10 | 16 | 7 | 5913.32 | 5734.83 | 5316.07 | 2223.72 |
| 223 | | | | | | | 4 | 4.5 | 2369.04 | 1703.21 | 2473.68 | 1263 |
| 224 | | | | | | 2 | 10 | 6 | 2274.28 | 1851.53 | 2415.18 | 1275 |
| 225 | | | | | 4 on 1 | | 16 | 7.5 | 2174.1 | 1769.66 | 2475.58 | 1281.36 |
| 226 | 400 | 0 | 0 | | | | 10 | 5 | 1861.25 | 1593.57 | 1830.64 | 1007.92 |
| 227 | | | | | | 6 | 16 | 6.5 | 1784.48 | 1431.07 | 1900.01 | 1014.29 |
| 228 | | | | | | 10 | 16 | 5.5 | 1444.09 | 1210.3 | 1433.06 | 789.3 |
| 229 | | | | | | | 4 | 9 | 10275.16 | 9077.77 | 8462.78 | 3606.33 |
| 230 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 231 | | | | | | | 16 | 15 | 11791.28 | 10143.28 | 9770.76 | 4077.14 |
| 232 | | | | | 2 on 1 | | 10 | 10 | 9218.23 | 8690.44 | 7744.27 | 3219.7 |
| 233 | | | | 8x10 | | 6 | 16 | 13 | 9310.46 | 8567.94 | 7852.63 | 3231.28 |
| 234 | | | | | | 10 | 16 | 11 | 7216.36 | 6989.18 | 6172.74 | 2517.42 |
| 235 | | | | | | | 4 | 8.5 | 3531.91 | 2370.4 | 9004.75 | 1284.39 |
| 236 | | | | | 4 on 1 | 2 | 10 | 10 | 3233.2 | 2480.36 | 3010.49 | 1287.32 |
| 237 | | | | | | | 16 | 11.5 | 2953.36 | 2271.44 | 2990.41 | 1288.61 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 238 | | | | | | | 10 | 9 | 2690.32 | 2179.9 | 2325.9 | 1020.25 |
| 239 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 2451.58 | 1856.48 | 2342.06 | 1021.54 |
| 240 | | | | | | 10 | 16 | 9.5 | 1764.32 | 1628.05 | 1773.53 | 796.55 |
| 241 | | | | | | | 4 | 11 | 10936.62 | 10101.39 | 9489.59 | 4062.94 |
| 242 | | | | | | 2 | 10 | 14 | 11003.74 | 8175.41 | 9349.09 | 4075.58 |
| 243 | | | | | 2 on 1 | | 16 | 17 | 11563.59 | 10133.39 | 9765.07 | 4267.42 |
| 244 | | | | | | | 10 | 12 | 8707.49 | 8653.98 | 7569.95 | 3228.97 |
| 245 | | | | | | 6 | 16 | 15 | 8746.44 | 8469.58 | 7553.73 | 3234.42 |
| 246 | | | 0 | 10x12 | | 10 | 16 | 13 | 6807.22 | 3901.05 | 5970.62 | 2521.2 |
| 247 | | | | | | | 4 | 10.5 | 2172.58 | 1592.73 | 2611.32 | 1287.78 |
| 248 | | | | | | 2 | 10 | 12 | 2032.15 | 1644.56 | 2250.65 | 1288.83 |
| 249 | | | | | 4 on 1 | | 16 | 13.5 | 1904.3 | 1521.79 | 2326.08 | 1289.35 |
| 250 | | | | | | | 10 | 11 | 1667.52 | 1423.3 | 1828.67 | 1021.76 |
| 251 | | | | | | 6 | 16 | 12.5 | 1557.86 | 1220.82 | 1823.5 | 1022.28 |
| 252 | 400 | 0 | | | | 10 | 16 | 11.5 | 1259.23 | 1078.86 | 1393.09 | 797.29 |
| 253 | | | | | | | 4 | 5 | 24093.96 | 20867.83 | 21636.09 | 9151.67 |
| 254 | | | | | | 2 | 10 | 8 | 24442.57 | 20109.35 | 21751.07 | 9238.77 |
| 255 | | | | | | | 16 | 11 | 28249.33 | 22789.74 | 24470.35 | 10420.64 |
| 256 | | | | | 2 on 1 | | 10 | 6 | 18962.72 | 18208.07 | 17217.93 | 7179.31 |
| 257 | | | | | | 6 | 16 | 9 | 19136.87 | 17158.26 | 17336.35 | 7227.46 |
| 258 | | | | 4x6 | | 10 | 16 | 7 | 14667.93 | 13976.37 | 13475.1 | 5547.47 |
| 259 | | | | | | | 4 | 4.5 | 5243.56 | 3498.6 | 7310.58 | 3258.88 |
| 260 | | | 5 | | | 2 | 10 | 6 | 4773.48 | 3745.36 | 6201.51 | 3275.22 |
| 261 | | | | | 4 on 1 | | 16 | 7.5 | 4425.03 | 3421.83 | 6226.75 | 3286.39 |
| 262 | | | | | | | 10 | 5 | 347.32 | 3152.16 | 4579.34 | 2549.58 |
| 263 | | | | | | 6 | 16 | 6.5 | 3531.92 | 2553.37 | 4604.19 | 2560.22 |
| 264 | | | | | | 10 | 16 | 5.5 | 2798.45 | 3233.56 | 3407.51 | 1967.52 |
| 265 | | | | | | | 4 | 9 | 25763.1 | 21597.81 | 21969.2 | 9254.85 |
| 266 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 267 | | | | | | | 16 | 15 | 29266.85 | 13388.74 | 14593.13 | 10443.95 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 268 | | | | | | | 10 | 10 | 22765.33 | 51166.04 | 19549.98 | 8124.95 |
| 269 | | | | | 2 on 1 | 6 | 16 | 13 | 22747.62 | 20243.93 | 19520.25 | 8144.23 |
| 270 | | | | | | 10 | 16 | 11 | 17455.85 | 16520.23 | 15279.03 | 6265.13 |
| 271 | | | | | | | 4 | 8.5 | 7087.27 | 4248.44 | 22465.93 | 3292.71 |
| 272 | | | | 8x10 | | 2 | 10 | 10 | 6231.15 | 4611.33 | 6865.51 | 3297.11 |
| 273 | | | | | 4 on 1 | | 16 | 11.5 | 5574.28 | 4220.42 | 6772.26 | 3299.8 |
| 274 | | | | | | | 10 | 9 | 5075.88 | 3938.73 | 5258.44 | 2570.92 |
| 275 | | | | | | 6 | 16 | 10.5 | 4490.73 | 3100.9 | 5175.78 | 2573.61 |
| 276 | | | | | | 10 | 16 | 9.5 | 3256.1 | 2877.31 | 3872.88 | 1980.79 |
| 277 | | | | | | | 4 | 11 | 28163.09 | 25038.38 | 25052.68 | 10420.64 |
| 278 | | | | | | 2 | 10 | 14 | 28271.15 | 19733.27 | 24324.61 | 10440.83 |
| 279 | | | 5 | | 2 on 1 | | 16 | 17 | 29720.1 | 24568.11 | 25197.2 | 10927.86 |
| 280 | | | | | | | 10 | 12 | 22018.42 | 20732.06 | 19448.77 | 8138.76 |
| 281 | | | | | | 6 | 16 | 15 | 22096.72 | 19995.99 | 19259.27 | 8148.81 |
| 282 | 400 | 0 | | 10x12 | | 10 | 16 | 13 | 16996.95 | 16661.28 | 15153.71 | 6271.72 |
| 283 | | | | | | | 4 | 10.5 | 4764.01 | 3363.89 | 7706.54 | 3298.24 |
| 284 | | | | | | 2 | 10 | 12 | 4418.47 | 3633.45 | 6248.34 | 3300.14 |
| 285 | | | | | 4 on 1 | | 16 | 13.5 | 4138.73 | 3268.59 | 6197.76 | 3300.86 |
| 286 | | | | | | | 10 | 11 | 3541.49 | 3013.99 | 4783.74 | 2573.94 |
| 287 | | | | | | 6 | 16 | 12.5 | 3289.17 | 2502.86 | 4733.76 | 2574.6 |
| 288 | | | | | | 10 | 16 | 11.5 | 2594.28 | 2247.93 | 3571.75 | 1981.78 |
| 289 | | | | | | | 4 | 5 | 20720.35 | 17814.87 | 20501.1 | 7813.93 |
| 290 | | | | | | 2 | 10 | 8 | 20892.02 | 17034.97 | 20818.78 | 7877.73 |
| 291 | | | | | | | 16 | 11 | 24054.25 | 19508.52 | 23172.08 | 8868.44 |
| 292 | | | | | 2 on 1 | | 10 | 6 | 16126.06 | 15311.46 | 15822.24 | 6090.99 |
| 293 | | | | | | 6 | 16 | 9 | 16244.31 | 1432.51 | 15921.02 | 6122.02 |
| 294 | | | 10 | 4x6 | | 10 | 16 | 7 | 12284.81 | 11613.65 | 12094.18 | 4636.26 |
| 295 | | | | | | | 4 | 4.5 | 4608.23 | 2904.71 | 8607.02 | 2777.98 |
| 296 | | | | | 4 on 1 | 2 | 10 | 6 | 4182.02 | 3090.79 | 6828.71 | 2792.56 |
| 297 | | | | | | | 16 | 7.5 | 3767.84 | 2810.14 | 6798.77 | 2798.9 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 298 | | | | | | | 10 | 5 | 3365.23 | 2585.1 | 5010.46 | 2163.87 |
| 299 | | | | 4x6 | 4 on 1 | 6 | 16 | 6.5 | 2999.01 | 2039.18 | 4956.5 | 2170.17 |
| 300 | | | | | | 10 | 16 | 5.5 | 2352.95 | 1874.83 | 3540.31 | 1645.3 |
| 301 | | | | | | | 4 | 9 | 21999.36 | 18186.47 | 20880.3 | 7887.07 |
| 302 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 303 | | | | | | | 16 | 15 | 24917.07 | 19887.01 | 23202.27 | 8885.57 |
| 304 | | | | | 2 on 1 | | 10 | 10 | 19302.56 | 17507.51 | 17914.66 | 6878.96 |
| 305 | | | | | | 6 | 16 | 13 | 19268.29 | 16770.31 | 17897.02 | 6891.46 |
| 306 | | | | 8x10 | | 10 | 16 | 11 | 14585.88 | 13721.15 | 13627.71 | 5228.18 |
| 307 | | | | | | | 4 | 8.5 | 5865.77 | 3237.22 | 20915.63 | 2808.18 |
| 308 | | | | | 4 on 1 | 2 | 10 | 10 | 5129.3 | 3527.73 | 7331.6 | 2805.4 |
| 309 | | | | | | | 16 | 11.5 | 4505.24 | 3258.12 | 7057.64 | 2807.07 |
| 310 | | | | | | | 10 | 9 | 4163 | 2992.61 | 5522.99 | 2176.46 |
| 311 | | | | | | 6 | 16 | 10.5 | 3613.01 | 2250.79 | 5379.28 | 2177.91 |
| 312 | 400 | 0 | 10 | | | 10 | 16 | 9.5 | 274.85 | 2135.64 | 3888.87 | 1652.81 |
| 313 | | | | | | | 4 | 11 | 24025.18 | 20742.73 | 23311.24 | 8868.44 |
| 314 | | | | | | 2 | 10 | 14 | 24099.09 | 16379.15 | 23023.88 | 8883.24 |
| 315 | | | | | 2 on 1 | | 16 | 17 | 25378.78 | 20587 | 23723.56 | 9295.95 |
| 316 | | | | | | | 10 | 12 | 18663.47 | 17419.66 | 17791.59 | 6889.15 |
| 317 | | | | | | 6 | 16 | 15 | 18707.27 | 16634.92 | 17718.14 | 6894.99 |
| 318 | | | | 10x12 | | 10 | 16 | 13 | 14189.73 | 13659.84 | 13645.97 | 5231.98 |
| 319 | | | | | | | 4 | 10.5 | 4005.03 | 2699.63 | 9047.18 | 2805.94 |
| 320 | | | | | | 2 | 10 | 12 | 3680.54 | 2916.79 | 6837.16 | 2807.36 |
| 321 | | | | | 4 on 1 | | 16 | 13.5 | 3430.43 | 2673.82 | 6738.73 | 2807.73 |
| 322 | | | | | | | 10 | 11 | 2936.66 | 2388.74 | 5183.62 | 2178.19 |
| 323 | | | | | | 6 | 16 | 12.5 | 2714.07 | 1986.18 | 5125.33 | 2178.56 |
| 324 | | | | | | 10 | 16 | 11.5 | 2112.79 | 1742.95 | 3778.08 | 1653.46 |
| 325 | | | | | | | 4 | 5 | 13813 | 12375.37 | 12025.24 | 5236.19 |
| 326 | | 3 | 0 | 4x6 | 2 on 1 | 2 | 10 | 8 | 14119.46 | 12579.31 | 12228.61 | 531861 |
| 327 | | | | | | | 16 | 11 | 16288.36 | 14280.25 | 13914.78 | 6010.03 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 328 | | | | | | | 10 | 6 | 11097.42 | 10831.42 | 9842.18 | 4193.22 |
| 329 | | | | | 2 on 1 | 6 | 16 | 9 | 11299.66 | 10434.23 | 9959.18 | 4234.53 |
| 330 | | | | 4x6 | | 10 | 16 | 7 | 8747.18 | 8483.14 | 7863.7 | 3289.4 |
| 331 | | | | | | | 4 | 4.5 | 3504.36 | 2519.44 | 3659.15 | 1868.26 |
| 332 | | | | | | 2 | 10 | 6 | 3364.18 | 2738.85 | 3572.6 | 1886.02 |
| 333 | | | | | 4 on 1 | | 16 | 7.5 | 3216 | 2617.73 | 3661.95 | 1895.42 |
| 334 | | | | | | | 10 | 5 | 2753.22 | 2357.26 | 2707.94 | 1490.95 |
| 335 | | | | | | 6 | 16 | 6.5 | 2639.66 | 2116.89 | 2810.56 | 1500.36 |
| 336 | | | | | | 10 | 16 | 5.5 | 2136.15 | 1790.31 | 2119.83 | 167.55 |
| 337 | | | | | | | 4 | 9 | 15199.34 | 13428.13 | 12518.41 | 5334.6 |
| 338 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 339 | | | | | | | 16 | 15 | 17442.04 | 15004.26 | 14453.22 | 6031.03 |
| 340 | | | | | 2 on 1 | | 10 | 10 | 13635.91 | 12855.18 | 11455.57 | 4762.68 |
| 341 | | | | | | 6 | 16 | 13 | 13772.32 | 12673.97 | 11615.86 | 4779.81 |
| 342 | 400 | 3 | 0 | 8x10 | | 10 | 16 | 11 | 10674.68 | 10338.61 | 9130.92 | 3723.84 |
| 343 | | | | | | | 4 | 8.5 | 5224.52 | 3506.38 | 13320.12 | 1899.91 |
| 344 | | | | | | 2 | 10 | 10 | 4782.66 | 3669.03 | 4453.21 | 1904.24 |
| 345 | | | | | 4 on 1 | | 16 | 11.5 | 4368.71 | 3359.99 | 4423.51 | 1906.15 |
| 346 | | | | | | | 10 | 9 | 3979.61 | 3224.58 | 3440.54 | 1509.18 |
| 347 | | | | | | 6 | 16 | 10.5 | 3626.46 | 2746.17 | 3464.45 | 1511.09 |
| 348 | | | | | | 10 | 16 | 9.5 | 2609.84 | 2408.26 | 2623.46 | 1178.29 |
| 349 | | | | | | | 4 | 11 | 16177.79 | 14942.3 | 14037.3 | 6010.03 |
| 350 | | | | | | 2 | 10 | 14 | 16277.09 | 12093.33 | 13829.48 | 6028.72 |
| 351 | | | | | | | 16 | 17 | 17105.24 | 14989.64 | 14444.8 | 6312.5 |
| 352 | | | | | 2 on 1 | | 10 | 12 | 12880.41 | 12801.25 | 11197.71 | 4776.39 |
| 353 | | | | | | 6 | 16 | 15 | 12938.02 | 12528.48 | 11173.72 | 4784.46 |
| 354 | | | | 10x12 | | 10 | 16 | 13 | 10069.45 | 10208.26 | 8831.93 | 3729.44 |
| 355 | | | | | | | 4 | 10.5 | 3213.75 | 2356.02 | 3862.75 | 1904.93 |
| 356 | | | | | 4 on 1 | 2 | 10 | 12 | 3006.02 | 2432.68 | 3477.15 | 1906.48 |
| 357 | | | | | | | 16 | 13.5 | 2816.91 | 2251.08 | 3440.81 | 1907.25 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 358 | | | | | | | 10 | 11 | 2466.65 | 2105.39 | 2705.03 | 1511.42 |
| 359 | | | 0 | 10x12 | 4 on 1 | 6 | 16 | 12.5 | 2304.43 | 1805.87 | 2697.38 | 1512.19 |
| 360 | | | | | | 10 | 16 | 11.5 | 1862.7 | 1595.88 | 2060.7 | 1179.38 |
| 361 | | | | | | | 4 | 5 | 35640.56 | 30868.36 | 32004.79 | 13537.45 |
| 362 | | | | | | 2 | 10 | 8 | 36156.23 | 29746.4 | 32174.88 | 13666.28 |
| 363 | | | | | | | 16 | 11 | 41787.32 | 33711.32 | 36197.32 | 15414.54 |
| 364 | | | | | 2 on 1 | | 10 | 6 | 28050.27 | 26933.97 | 25469.31 | 10619.87 |
| 365 | | | | | | 6 | 16 | 9 | 28307.87 | 25381.04 | 25644.49 | 10691.1 |
| 366 | | | | 4x6 | | 10 | 16 | 7 | 21697.28 | 20674.29 | 19932.8 | 8206 |
| 367 | | | | | | | 4 | 4.5 | 7756.44 | 5175.25 | 10814.05 | 4820.65 |
| 368 | | | | | | 2 | 10 | 6 | 7061.08 | 5540.26 | 9173.47 | 4844.81 |
| 369 | | | | | 4 on 1 | | 16 | 7.5 | 6545.65 | 5061.68 | 9210.81 | 4861.34 |
| 370 | | | | | | | 10 | 5 | 5691.08 | 4662.77 | 6773.91 | 3771.42 |
| 371 | | | | | | 6 | 16 | 6.5 | 5224.52 | 3777.03 | 6810.66 | 3787.16 |
| 372 | 400 | 3 | | | | 10 | 16 | 5.5 | 4139.55 | 3435.6 | 5040.49 | 2910.42 |
| 373 | | | | | | | 4 | 9 | 38109.61 | 31948.18 | 32497.54 | 13690.07 |
| 374 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 375 | | | | | | | 16 | 15 | 43292.47 | 34597.38 | 36378.95 | 15449.03 |
| 376 | | | | | 2 on 1 | | 10 | 10 | 33675.21 | 31309.48 | 28918.96 | 12018.69 |
| 377 | | | | | | 6 | 16 | 13 | 33649 | 29945.48 | 28874.98 | 12047.2 |
| 378 | | | 5 | 8x10 | | 10 | 16 | 11 | 25821.25 | 24437.26 | 22601.23 | 9267.58 |
| 379 | | | | | | | 4 | 8.5 | 10483.72 | 6284.44 | 33232.32 | 4870.68 |
| 380 | | | | | | 2 | 10 | 10 | 9217.32 | 6821.22 | 10155.69 | 4877.19 |
| 381 | | | | | 4 on 1 | | 16 | 11.5 | 8245.65 | 6242.99 | 10017.75 | 4881.17 |
| 382 | | | | | | | 10 | 9 | 7508.4 | 5826.3 | 778.45 | 3802.99 |
| 383 | | | | | | 6 | 16 | 10.5 | 6642.83 | 4586.95 | 7656.18 | 3806.96 |
| 384 | | | | | | 10 | 16 | 9.5 | 4816.52 | 4256.21 | 5728.88 | 2930.05 |
| 385 | | | | | | | 4 | 11 | 41659.74 | 37037.57 | 67058.73 | 15414.54 |
| 386 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 41819.6 | 29190.09 | 35981.75 | 15444.41 |
| 387 | | | | | | | 16 | 17 | 43962.93 | 36341.94 | 37272.51 | 1614.84 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 388 | | | | | | | 10 | 12 | 32570.36 | 30667.53 | 28769.24 | 12039.12 |
| 389 | | | | | 2 on 1 | 6 | 16 | 15 | 32686.18 | 29578.71 | 28488.93 | 12053.99 |
| 390 | | | | | | 10 | 16 | 13 | 25142.43 | 24645.9 | 22415.86 | 9277.33 |
| 391 | | | | | | | 4 | 10.5 | 7047.08 | 4975.98 | 11399.77 | 4878.87 |
| 392 | | | 5 | 10x12 | | 2 | 10 | 12 | 6535.94 | 5374.72 | 9242.74 | 4881.67 |
| 393 | | | | | 4 on 1 | | 16 | 13.5 | 6122.14 | 4835 | 9167.93 | 4882.74 |
| 394 | | | | | | | 10 | 11 | 5238.68 | 4458.39 | 7076.26 | 3807.45 |
| 395 | | | | | | 6 | 16 | 12.5 | 4865.45 | 3702.31 | 7002.33 | 3808.43 |
| 396 | | | | | | 10 | 16 | 11.5 | 3837.54 | 3325.2 | 5283.45 | 2931.51 |
| 397 | | | | | | | 4 | 5 | 30650.2 | 26352.33 | 30325.89 | 11558.62 |
| 398 | | | | | | 2 | 10 | 8 | 30904.15 | 25198.67 | 30795.81 | 11652.99 |
| 399 | | | | | | | 16 | 11 | 35581.81 | 28857.63 | 34276.88 | 13118.48 |
| 400 | | | | | 2 on 1 | | 10 | 6 | 23854.19 | 22649.2 | 23404.76 | 9009.98 |
| 401 | | | | | | 6 | 16 | 9 | 24029.1 | 21245.48 | 23550.89 | 9055.89 |
| 402 | | | | 4x6 | | 10 | 16 | 7 | 18172.08 | 17179.28 | 17890.1 | 6858.11 |
| 403 | | | | | | | 4 | 4.5 | 6816.64 | 4296.75 | 12731.77 | 4109.28 |
| 404 | | | | | | 2 | 10 | 6 | 6186.17 | 4571.99 | 10101.24 | 4130.84 |
| 405 | 400 | 3 | 10 | | 4 on 1 | | 16 | 7.5 | 5573.51 | 4156.84 | 10056.96 | 4140.23 |
| 406 | | | | | | | 10 | 5 | 4977.95 | 3823.96 | 7411.63 | 3200.86 |
| 407 | | | | | | 6 | 16 | 6.5 | 4436.24 | 3016.42 | 7331.82 | 3210.18 |
| 408 | | | | | | 10 | 16 | 5.5 | 3480.55 | 2773.3 | 5236.94 | 2433.77 |
| 409 | | | | | | | 4 | 9 | 32542.16 | 26902.01 | 30886.82 | 11666.81 |
| 410 | | | | | | 2 | 10 | 12 | 6625.35 | 5903.36 | 5079.06 | 2576.78 |
| 411 | | | | | | | 16 | 15 | 36858.14 | 29417.51 | 34321.55 | 13143.82 |
| 412 | | | | | 2 on 1 | | 10 | 10 | 28552.96 | 25897.68 | 26499.95 | 10175.57 |
| 413 | | | | | | 6 | 16 | 13 | 28502.27 | 24807.18 | 26473.85 | 10194.07 |
| 414 | | | | 8x10 | | 10 | 16 | 11 | 21575.9 | 20296.77 | 2058.54 | 7733.69 |
| 415 | | | | | | | 4 | 8.5 | 8676.84 | 4788.6 | 30939.07 | 4145.07 |
| 416 | | | | | 4 on 1 | 2 | 10 | 10 | 7587.42 | 5218.33 | 10845.13 | 4149.84 |
| 417 | | | | | | | 16 | 11.5 | 6664.29 | 4219.51 | 10439.88 | 4152.32 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 418 | | | | | | | 10 | 9 | 6158.04 | 4426.77 | 8169.79 | 3219.49 |
| 419 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 2724.18 | 1697.08 | 4055.94 | 1642.13 |
| 420 | | | | | | 10 | 16 | 9.5 | 4015.9 | 3159.1 | 5752.54 | 2444.89 |
| 421 | | | | | | | 4 | 11 | 35538.82 | 30683.31 | 34482.74 | 13118.48 |
| 422 | | | | | | 2 | 10 | 14 | 35648.14 | 24228.56 | 34059.66 | 13140.37 |
| 423 | | | | | 2 on 1 | | 16 | 17 | 37452.36 | 30452.96 | 35092.66 | 13750.86 |
| 424 | | | | | | | 10 | 12 | 27607.6 | 25767.72 | 26317.89 | 10190.65 |
| 425 | | | | | | 6 | 16 | 15 | 27672.39 | 24606.9 | 26209.24 | 10199.29 |
| 426 | 400 | 3 | 10 | 10x12 | | 10 | 16 | 13 | 20989.9 | 20206.08 | 50785.55 | 7739.31 |
| 427 | | | | | | | 4 | 10.5 | 5924.38 | 3993.38 | 13382.88 | 4150.64 |
| 428 | | | | | | 2 | 10 | 12 | 5444.37 | 4314.61 | 10113.74 | 4152.74 |
| 429 | | | | | 4 on 1 | | 16 | 13.5 | 5074.4 | 3955.19 | 9968.14 | 4153.29 |
| 430 | | | | | | | 10 | 11 | 4344.01 | 3533.5 | 7667.78 | 3222.05 |
| 431 | | | | | | 6 | 16 | 12.5 | 4014.73 | 2938 | 7581.56 | 3222.6 |
| 432 | | | | | | 10 | 16 | 11.5 | 2112.79 | 1742.95 | 3775.08 | 1653.46 |
| 433 | | | | | | | 4 | 5 | 17975.56 | 14890.83 | 16134.57 | 6814.13 |
| 434 | | | | | | 2 | 10 | 8 | 18374.38 | 15658.25 | 15913.72 | 6921.37 |
| 435 | | | | | | | 16 | 11 | 21182.57 | 18583.62 | 18108.01 | 7821.15 |
| 436 | | | | | 2 on 1 | | 10 | 6 | 14441.64 | 13158.94 | 12808.13 | 5456.85 |
| 437 | | | | | | 6 | 16 | 9 | 14707.82 | 13578.6 | 12960.39 | 5510.61 |
| 438 | 800 | 0 | 0 | 4x6 | | 10 | 16 | 7 | 11383.15 | 10231.24 | 10233.41 | 4280.67 |
| 439 | | | | | | | 4 | 4.5 | 4560.4 | 2865.39 | 4761.84 | 2431.27 |
| 440 | | | | | | 2 | 10 | 6 | 4377.98 | 3190.61 | 5042.08 | 2454.37 |
| 441 | | | | | 4 on 1 | | 16 | 7.5 | 4185.14 | 3406.59 | 4765.48 | 2466.61 |
| 442 | | | | | | | 10 | 5 | 3582.91 | 2543.97 | 3759.04 | 1940.26 |
| 443 | | | | | | 6 | 16 | 6.5 | 3435.12 | 2754.81 | 3657.52 | 1952.5 |
| 444 | | | | | | 10 | 16 | 5.5 | 2779.88 | 2329.82 | 2758.64 | 1519.39 |
| 445 | | | | | | | 4 | 9 | 19779.69 | 16071.27 | 16290.85 | 6942.19 |
| 446 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 22535.65 | 18985.98 | 16566.8 | 18414.16 |
| 447 | | | | | | | 16 | 15 | 22692.21 | 19525.81 | 18808.72 | 7848.49 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 448 | | | | | | | 10 | 10 | 17745.11 | 15736.03 | 14907.72 | 6197.92 |
| 449 | | | | | 2 on 1 | 6 | 16 | 13 | 17922.63 | 16493.28 | 15116.32 | 6220.22 |
| 450 | | | | | | 10 | 16 | 11 | 13891.5 | 12316.74 | 11882.53 | 4846.03 |
| 451 | | | | | | | 4 | 8.5 | 6798.94 | 3744.9 | 17105.7 | 2472.45 |
| 452 | | | | | 4 on 1 | 2 | 10 | 10 | 6223.92 | 4123.77 | 6067.1 | 2478.09 |
| 453 | | | | 8x10 | | | 16 | 11.5 | 5685.22 | 4372.52 | 5756354 | 2480.58 |
| 454 | | | | | | | 10 | 9 | 5178.86 | 3384.45 | 4600.45 | 1963.97 |
| 455 | | | | | | 6 | 16 | 10.5 | 4719.3 | 3650.09 | 4507.34 | 1966.47 |
| 456 | | | 0 | | | 10 | 16 | 9.5 | 3396.32 | 3133.99 | 3414.04 | 1533.36 |
| 457 | | | | | | | 4 | 11 | 21052.99 | 18174.54 | 18049.81 | 7821.15 |
| 458 | | | | | | 2 | 10 | 14 | 21182.21 | 18719.92 | 18228.1 | 21329.88 |
| 459 | | | | | 2 on 1 | | 16 | 17 | 22259.92 | 19506.79 | 18797.76 | 8214.78 |
| 460 | | | | | | | 10 | 12 | 16761.93 | 15853.22 | 21296.93 | 6215.76 |
| 461 | | | | | | 6 | 16 | 15 | 16836.91 | 16303.95 | 14540.93 | 6226.27 |
| 462 | 800 | 0 | | 10x12 | | 10 | 16 | 13 | 13103.89 | 12239.87 | 11493.45 | 4853.31 |
| 463 | | | | | | | 4 | 10.5 | 4182.21 | 2653.19 | 5592.08 | 2478.98 |
| 464 | | | | | | 2 | 10 | 12 | 3911.88 | 2841.35 | 5078.91 | 2481 |
| 465 | | | | | 4 on 1 | | 16 | 13.5 | 3665.79 | 2929.45 | 4477.71 | 2482 |
| 466 | | | | | | | 10 | 11 | 3209.98 | 2307.48 | 3949.39 | 1966.89 |
| 467 | | | | | | 6 | 16 | 12.5 | 2998.88 | 2347.39 | 3510.24 | 1967.89 |
| 468 | | | | | | 10 | 16 | 11.5 | 242.02 | 2076.8 | 2681.7 | 1534.79 |
| 469 | | | | | | | 4 | 5 | 46380.88 | 36365.65 | 42609.46 | 17616.97 |
| 470 | | | | | | 2 | 10 | 8 | 47051.95 | 37713.44 | 41870.82 | 17784.62 |
| 471 | | | | | | | 16 | 11 | 54379.96 | 43870.25 | 47105.43 | 20059.73 |
| 472 | | | | | 2 on 1 | | 10 | 6 | 36503.25 | 32085.84 | 33144.62 | 13820.17 |
| 473 | | | | | | 6 | 16 | 9 | 36838.48 | 33029.65 | 33372.48 | 13912.87 |
| 474 | | | 5 | 4x6 | | 10 | 16 | 7 | 28235.77 | 24364.13 | 25938.79 | 10678.89 |
| 475 | | | | | | | 4 | 4.5 | 10093.86 | 5766.11 | 14072.88 | 6273.35 |
| 476 | | | | | 4 on 1 | 2 | 10 | 6 | 9188.95 | 6316.29 | 14162.3 | 6304.79 |
| 477 | | | | | | | 16 | 7.5 | 8518.19 | 6587.02 | 11986.5 | 6326.31 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 478 | | | | | | | 10 | 5 | 7406.09 | 4953.34 | 10193.21 | 4907.95 |
| 479 | | | | 4x6 | 4 on 1 | 6 | 16 | 6.5 | 6798.94 | 4915.25 | 8863.06 | 4928.43 |
| 480 | | | | | | 10 | 16 | 5.5 | 5387.01 | 4470.92 | 6559.45 | 3787.48 |
| 481 | | | | | | | 4 | 9 | 49593.98 | 37602.34 | 42290.71 | 17815.59 |
| 482 | | | | | | 2 | 10 | 12 | 22535.65 | 18985.98 | 16566.8 | 18414.16 |
| 483 | | | | | | | 16 | 15 | 56338.7 | 45023.34 | 47341.79 | 20104.61 |
| 484 | | | | | 2 on 1 | | 10 | 10 | 43823.27 | 37537.19 | 37633.72 | 15640.53 |
| 485 | | | | | | 6 | 16 | 13 | 43789.16 | 38969.57 | 37576.49 | 15677.64 |
| 486 | | | | 8x10 | | 10 | 16 | 11 | 33602.51 | 28629.28 | 29412.13 | 12060.38 |
| 487 | | | | | | | 4 | 8.5 | 13643 | 6806.77 | 42998.38 | 6338.46 |
| 488 | | | | | | 2 | 10 | 10 | 11994.96 | 7642.61 | 15145.83 | 6346.94 |
| 489 | | | | | 4 on 1 | | 16 | 11.5 | 10730.48 | 8124.32 | 13036.61 | 6352.12 |
| 490 | | | | | | | 10 | 9 | 9771.07 | 5941.34 | 11482.63 | 4949.03 |
| 491 | | | | | | 6 | 16 | 10.5 | 8644.65 | 6099.97 | 9933.43 | 4954.2 |
| 492 | 800 | 0 | 5 | | | 10 | 16 | 9.5 | 6267.98 | 5538.83 | 7455.29 | 3813.03 |
| 493 | | | | | | | 4 | 11 | 54213.95 | 43688.47 | 47012.59 | 20059.73 |
| 494 | | | | | | 2 | 10 | 14 | 54421.98 | 44761.75 | 47987.48 | 54740.93 |
| 495 | | | | | 2 on 1 | | 16 | 17 | 57211.2 | 47293.62 | 48505.62 | 21036.13 |
| 496 | | | | | | | 10 | 12 | 42385.47 | 38538.2 | 53864.71 | 15667.12 |
| 497 | | | | | | 6 | 16 | 15 | 42536.19 | 38492.29 | 37074.1 | 15686.47 |
| 498 | | | | 10x12 | | 10 | 16 | 13 | 32719.13 | 29327.88 | 29170.9 | 12073.06 |
| 499 | | | | | | | 4 | 10.5 | 9170.72 | 5700.99 | 16454.47 | 6349.12 |
| 500 | | | | | | 2 | 10 | 12 | 8505.56 | 6145.64 | 14796.85 | 6352.77 |
| 501 | | | | | | | 16 | 13.5 | 7967.06 | 6292.03 | 11930.69 | 6354.16 |
| 502 | | | | | | | 10 | 11 | 6817.37 | 4890.75 | 11252.17 | 4954.83 |
| 503 | | | | | 4 on 1 | 6 | 16 | 12.5 | 6331.65 | 4816.79 | 9112.49 | 4956.11 |
| 504 | | | | | | 10 | 16 | 11.5 | 4993.98 | 4327.26 | 6875.62 | 3814.92 |
| 505 | | | | | | | 4 | 5 | 39886.68 | 30866.83 | 40219.34 | 15041.82 |
| 506 | | | | | | 2 | 10 | 8 | 40217.15 | 31833.4 | 40076.17 | 15164.63 |
| 507 | | | | | | | 16 | 11 | 46304.43 | 37553.91 | 44606.26 | 17071.75 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 508 | | | | | | | 10 | 6 | 31042.68 | 27005.88 | 30457.83 | 11725.15 |
| 509 | | | | | 2 on 1 | 6 | 16 | 9 | 31270.3 | 27647.83 | 30647.97 | 11784.89 |
| 510 | | | | 4x6 | | 10 | 16 | 7 | 23648.26 | 20207.24 | 23281.09 | 8924.81 |
| 511 | | | | | | | 4 | 4.5 | 8870.85 | 4744.68 | 16568.51 | 5347.62 |
| 512 | | | | | | 2 | 10 | 6 | 8050.38 | 5208.46 | 16589.46 | 5375.67 |
| 513 | | | | | 4 on 1 | | 16 | 7.5 | 7253.09 | 5409.51 | 13087.63 | 5387.89 |
| 514 | | | | | | | 10 | 5 | 647.06 | 4035.3 | 11851.63 | 4165.45 |
| 515 | | | | | | 6 | 16 | 6.5 | 5773.1 | 3952.42 | 9541.27 | 4177.57 |
| 516 | | | | | | 10 | 16 | 5.5 | 4529.42 | 3609.04 | 6815.1 | 3167.19 |
| 517 | | | | | | | 4 | 9 | 42348.78 | 31656.97 | 40194.59 | 15182.62 |
| 518 | | | | | | 2 | 10 | 12 | 22535.65 | 18985.98 | 16566.8 | 18414.16 |
| 519 | | | | | | | 16 | 15 | 47965.38 | 38282.51 | 44664.38 | 17104.72 |
| 520 | | | | | 2 on 1 | | 10 | 10 | 37157.43 | 31167.21 | 34485.74 | 13242 |
| 521 | | | | | | 6 | 16 | 13 | 37091.46 | 32282.85 | 34451.77 | 13266.07 |
| 522 | 800 | 0 | 10 | 8x10 | | 10 | 16 | 11 | 28077.82 | 23519.08 | 26233.34 | 10064.24 |
| 523 | | | | | | | 4 | 8.5 | 11291.61 | 5132.84 | 40485.13 | 5394.19 |
| 524 | | | | | | 2 | 10 | 10 | 9873.9 | 5780.56 | 17365.5 | 5400.4 |
| 525 | | | | | 4 on 1 | | 16 | 11.5 | 8672.58 | 6271.88 | 13585.95 | 5403.63 |
| 526 | | | | | | | 10 | 9 | 8013.77 | 4368.34 | 13261.17 | 4189.69 |
| 527 | | | | | | 6 | 16 | 10.5 | 6955.04 | 4464.98 | 10282.13 | 4192.47 |
| 528 | | | | | | 10 | 16 | 9.5 | 5226.09 | 4111.1 | 7486.08 | 3181.66 |
| 529 | | | | | | | 4 | 11 | 46248.49 | 36362.8 | 44383.82 | 17071.75 |
| 530 | | | | | | 2 | 10 | 14 | 46390.75 | 36650.1 | 44760.74 | 46608.89 |
| 531 | | | | | 2 on 1 | | 16 | 17 | 48738.66 | 39629.99 | 45667.87 | 17894.7 |
| 532 | | | | | | | 10 | 12 | 35927.19 | 31726.4 | 47582.44 | 13261.61 |
| 533 | | | | | | 6 | 16 | 15 | 36011.5 | 32022.22 | 34107.42 | 13272.86 |
| 534 | | | | 10x12 | | 10 | 16 | 13 | 27315.23 | 23699.54 | 26268.49 | 10071.57 |
| 535 | | | | | | | 4 | 10.5 | 7709.69 | 4537.8 | 18148.54 | 5401.44 |
| 536 | | | | | 4 on 1 | 2 | 10 | 12 | 7085.03 | 4910.28 | 17312.34 | 5404.17 |
| 537 | | | | | | | 16 | 13.5 | 6603.58 | 5147.1 | 12972.05 | 5404.89 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538 | | | | | | | 10 | 11 | 5653.08 | 3824.82 | 12976.07 | 4193.02 |
| 539 | | 0 | 10 | 10x12 | 4 on 1 | 6 | 16 | 12.5 | 5224.58 | 3725.76 | 9866.27 | 4193.74 |
| 540 | | | | | | 10 | 16 | 11.5 | 4067.12 | 3355.19 | 7272.8 | 3182.92 |
| 541 | | | | | | | 4 | 5 | 26134.7 | 21649.8 | 23458.08 | 9907.07 |
| 542 | | | | | | 2 | 10 | 8 | 26714.53 | 22765.55 | 23136.98 | 10062.99 |
| 543 | | | | | | | 16 | 11 | 30797.36 | 27018.74 | 26327.26 | 11371.19 |
| 544 | | | | | 2 on 1 | | 10 | 6 | 20996.72 | 19131.79 | 18621.76 | 7933.72 |
| 545 | | | | | | 6 | 16 | 9 | 21379.36 | 19741.95 | 18843.12 | 8011.89 |
| 546 | | | | 4x6 | | 10 | 16 | 7 | 16549.98 | 14875.21 | 14878.37 | 6223.67 |
| 547 | | | | | | | 4 | 4.5 | 6630.38 | 4166 | 6923.25 | 3534.82 |
| 548 | | | | | | 2 | 10 | 6 | 3635.15 | 4638.83 | 7330.69 | 3568.42 |
| 549 | | | | | 4 on 1 | | 16 | 7.5 | 6084.79 | 4952.85 | 6928.54 | 3586.21 |
| 550 | | | | | | | 10 | 5 | 5209.2 | 3698.68 | 5465.28 | 2820.94 |
| 551 | | | | | | 6 | 16 | 6.5 | 4994.32 | 4005.23 | 5317.68 | 2838.74 |
| 552 | 800 | 3 | 0 | | | 10 | 16 | 5.5 | 4041.67 | 3387.33 | 4010.79 | 2209.05 |
| 553 | | | | | | | 4 | 9 | 28757.71 | 23366.04 | 23685.29 | 10093.25 |
| 554 | | | | | | 2 | 10 | 12 | 32764.62 | 27603.75 | 24086.5 | 26772.37 |
| 555 | | | | | | | 16 | 15 | 33000.93 | 28388.6 | 27346.02 | 11410.93 |
| 556 | | | | | 2 on 1 | | 10 | 10 | 25799.63 | 23024.02 | 21674.35 | 9011.16 |
| 557 | | | | | | 6 | 16 | 13 | 26057.73 | 23979.61 | 21977.63 | 9043.58 |
| 558 | | | | 8x10 | | 10 | 16 | 11 | 20196.88 | 17907.33 | 17276.03 | 7045.65 |
| 559 | | | | | | | 4 | 8.5 | 9884.98 | 5444.71 | 24870 | 3594.69 |
| 560 | | | | | | 2 | 10 | 10 | 9048.96 | 5995.56 | 8820.96 | 3602.89 |
| 561 | | | | | 4 on 1 | | 16 | 11.5 | 8265.75 | 6357.21 | 8369.44 | 3606.51 |
| 562 | | | | | | | 10 | 9 | 7529.56 | 4920.65 | 6688.6 | 2855.43 |
| 563 | | | | | | 6 | 16 | 10.5 | 6861.39 | 5306.87 | 6553.23 | 2859.05 |
| 564 | | | | | | 10 | 16 | 9.5 | 4937.92 | 4556.52 | 4963.68 | 2229.36 |
| 565 | | | | | | | 4 | 11 | 30608.97 | 26423.98 | 26242.64 | 11371.19 |
| 566 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 30796.85 | 27216.91 | 26501.86 | 31011.54 |
| 567 | | | | | | | 16 | 17 | 32363.73 | 28360.94 | 27330.09 | 11943.47 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 568 | | | | | | | 10 | 12 | 24370.19 | 23049.01 | 30963.63 | 9037.11 |
| 569 | | | | | 2 on 1 | 6 | 16 | 15 | 24479.2 | 23704.33 | 21141.07 | 9052.38 |
| 570 | | | | | | 10 | 16 | 13 | 19051.77 | 17795.56 | 16710.34 | 7056.23 |
| 571 | | | 0 | 10x12 | | | 4 | 10.5 | 6080.53 | 3857.48 | 8130.33 | 3604.2 |
| 572 | | | | | | 2 | 10 | 12 | 5687.49 | 4131.04 | 7384.24 | 3607.13 |
| 573 | | | | | 4 on 1 | | 16 | 13.5 | 5329.69 | 4259.13 | 6510.14 | 3608.59 |
| 574 | | | | | | | 10 | 11 | 4667 | 3354.85 | 5742.02 | 2859.66 |
| 575 | | | | | | 6 | 16 | 12.5 | 4360.07 | 3412.88 | 5103.54 | 2861.12 |
| 576 | | | | | | 10 | 16 | 11.5 | 3524.29 | 3019.47 | 3898.93 | 2231.43 |
| 577 | | | | | | | 4 | 5 | 67433.22 | 52872.07 | 61949.95 | 25613.33 |
| 578 | | | | | | 2 | 10 | 8 | 68408.9 | 54831.62 | 60876.04 | 25857.09 |
| 579 | | | | | | | 16 | 11 | 79163.1 | 63783.02 | 68486.64 | 29164.86 |
| 580 | | | | | 2 on 1 | | 10 | 6 | 53072.12 | 46649.64 | 18189.01 | 20093.17 |
| 581 | | | | | | 6 | 16 | 9 | 53559.52 | 18021.85 | 48520.29 | 20227.94 |
| 582 | 800 | 3 | | 4x6 | | 10 | 16 | 7 | 41052.02 | 35423.04 | 37712.43 | 15526.05 |
| 583 | | | | | | | 4 | 4.5 | 14675.47 | 8383.35 | 20460.57 | 9120.84 |
| 584 | | | | | | 2 | 10 | 6 | 13359.82 | 9183.26 | 20590.59 | 9166.55 |
| 585 | | | 5 | | 4 on 1 | | 16 | 7.5 | 12384.61 | 9576.88 | 17427.18 | 9197.82 |
| 586 | | | | | | | 10 | 5 | 10767.72 | 7201.67 | 14819.93 | 7135.67 |
| 587 | | | | | | 6 | 16 | 6.5 | 9884.98 | 7146.28 | 12886.02 | 1765.45 |
| 588 | | | | | | 10 | 16 | 5.5 | 7832.18 | 6500.28 | 7513.85 | 5506.62 |
| 589 | | | | | | | 4 | 9 | 72104.75 | 54670.1 | 61486.52 | 25902.11 |
| 590 | | | | | | 2 | 10 | 12 | 22535.65 | 18985.98 | 16566.8 | 18414.16 |
| 591 | | | | | | | 16 | 15 | 81910.91 | 65459.49 | 68830.29 | 29230.11 |
| 592 | | | | | 2 on 1 | | 10 | 10 | 63714.71 | 54575.37 | 54715.71 | 22739.79 |
| 593 | | | | | | 6 | 16 | 13 | 63665.12 | 56657.92 | 54632.5 | 22793.74 |
| 594 | | | | 8x10 | | 10 | 16 | 11 | 48854.74 | 41624.14 | 42762.34 | 17534.6 |
| 595 | | | | | | | 4 | 8.5 | 19835.58 | 9896.37 | 62515.39 | 9215.49 |
| 596 | | | | | 4 on 1 | 2 | 10 | 10 | 17439.49 | 11111.6 | 22020.54 | 9227.82 |
| 597 | | | | | | | 16 | 11.5 | 15601.06 | 11811.96 | 18953.94 | 9235.36 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 598 | | | | | | | 10 | 9 | 14206.17 | 8638.12 | 16694.62 | 7195.4 |
| 599 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 12568.46 | 8868.75 | 14442.22 | 7202.91 |
| 600 | | | | | | 10 | 16 | 9.5 | 9113.03 | 8052.91 | 10839.25 | 5543.76 |
| 601 | | | | | | | 4 | 11 | 78821.73 | 63518.72 | 68351.66 | 29164.86 |
| 602 | | | | | | 2 | 10 | 14 | 79124.18 | 65079.16 | 69769.05 | 79587.91 |
| 603 | | | 5 | | 2 on 1 | | 16 | 17 | 83179.44 | 68760.26 | 70520.93 | 30584.46 |
| 604 | | | | | | | 10 | 12 | 61624.29 | 56030.73 | 78313.98 | 22778.45 |
| 605 | | | | | | 6 | 16 | 15 | 61843.42 | 55963.99 | 53902.08 | 22806.57 |
| 606 | | | | 10x12 | | 10 | 16 | 13 | 47570.39 | 42639.84 | 42411.61 | 17553.04 |
| 607 | | | | | | | 4 | 10.5 | 13333.33 | 8288.68 | 23923.18 | 9231 |
| 608 | | | | | | 2 | 10 | 12 | 12366.24 | 8935.16 | 21513.16 | 9236.3 |
| 609 | | | | | 4 on 1 | | 16 | 13.5 | 11583.31 | 9148 | 17346.05 | 9238.32 |
| 610 | | | | | | | 10 | 11 | 9911.78 | 7110.67 | 16358.09 | 7203.84 |
| 611 | | | | | | 6 | 16 | 12.5 | 9205.6 | 7003.14 | 13248.65 | 7205.69 |
| 612 | 800 | 3 | | | | 10 | 16 | 11.5 | 7260.76 | 6291.41 | 996.48 | 5546.52 |
| 613 | | | | | | | 4 | 5 | 57991.29 | 4877.32 | 58474.95 | 21869.32 |
| 614 | | | | | | 2 | 10 | 8 | 58471.77 | 46282.62 | 58266.8 | 22047.88 |
| 615 | | | | | | | 16 | 11 | 67322.08 | 54599.69 | 64853.1 | 24820.65 |
| 616 | | | | | 2 on 1 | | 10 | 6 | 45133 | 39263.89 | 44282.69 | 17047.22 |
| 617 | | | | | | 6 | 16 | 9 | 45463.94 | 40197.22 | 44559.13 | 17134.07 |
| 618 | | | | 4x6 | | 10 | 16 | 7 | 3482.24 | 29379.33 | 33848.41 | 12975.79 |
| 619 | | | | | | | 4 | 4.5 | 12897.34 | 6898.29 | 24088.98 | 7774.91 |
| 620 | | | | | | 2 | 10 | 6 | 11704.46 | 7572.59 | 24119.44 | 7815.69 |
| 621 | | | 10 | | 4 on 1 | | 16 | 7.5 | 10545.28 | 7864.9 | 19028.13 | 7833.46 |
| 622 | | | | | | | 10 | 5 | 9418.46 | 5866.93 | 17231.1 | 6056.15 |
| 623 | | | | | | 6 | 16 | 6.5 | 8393.52 | 5707.17 | 13872.06 | 6073.78 |
| 624 | | | | | | 10 | 16 | 5.5 | 6585.33 | 5247.19 | 9908.48 | 4604.79 |
| 625 | | | | | | | 4 | 9 | 61570.95 | 45893.81 | 58438.98 | 22074.03 |
| 626 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 22535.65 | 18985.98 | 16566.8 | 18414.16 |
| 627 | | | | | | | 16 | 15 | 47965.38 | 38282.51 | 44664.38 | 17104.72 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 628 | | | | | | | 10 | 10 | 37157.43 | 31167.21 | 34485.74 | 13242 |
| 629 | | | | | 2 on 1 | 6 | 16 | 13 | 37091.46 | 32282.58 | 34451.77 | 13266.07 |
| 630 | | | | | | 10 | 16 | 11 | 28077.82 | 23519.08 | 26233.34 | 10064.24 |
| 631 | | | | | | | 4 | 8.5 | 11291.61 | 5132.84 | 40485.13 | 5394.19 |
| 632 | | | | | | 2 | 10 | 10 | 9873.9 | 5780.56 | 17365.5 | 5400.4 |
| 633 | | | | 8x10 | 4 on 1 | | 16 | 11.5 | 8672.58 | 6271.88 | 13585.95 | 5403.63 |
| 634 | | | | | | | 10 | 9 | 8013.77 | 4368.34 | 13261.17 | 4189.69 |
| 635 | | | | | | 6 | 16 | 10.5 | 10111.95 | 6491.64 | 14949.2 | 6095.44 |
| 636 | | | | | | 10 | 16 | 9.5 | 7598.22 | 5977.14 | 10884.02 | 4625.82 |
| 637 | | | | | | | 4 | 11 | 67240.74 | 52867.93 | 64529.7 | 24820.65 |
| 638 | | | | | | 2 | 10 | 14 | 67447.58 | 53285.64 | 65077.71 | 67764.73 |
| 639 | 800 | 3 | 10 | | 2 on 1 | | 16 | 17 | 70861.21 | 57618.1 | 66396.58 | 26017.13 |
| 640 | | | | | | | 10 | 12 | 52234.59 | 46127.06 | 69180.17 | 19281.08 |
| 641 | | | | | | 6 | 16 | 15 | 52357.17 | 46557.15 | 49588.82 | 19297.43 |
| 642 | | | | 10x12 | | 10 | 16 | 13 | 39713.65 | 34456.79 | 38191.8 | 14643.06 |
| 643 | | | | | | | 4 | 10.5 | 11209.13 | 6597.52 | 26386.19 | 7853.17 |
| 644 | | | | | | 2 | 10 | 12 | 10300.94 | 7139.06 | 25170.44 | 7857.13 |
| 645 | | | | | 4 on 1 | | 16 | 13.5 | 9600.95 | 7483.37 | 18860.09 | 7858.18 |
| 646 | | | | | | | 10 | 11 | 8219.02 | 5560.91 | 18865.93 | 6096.24 |
| 647 | | | | | | 6 | 16 | 12.5 | 7596.02 | 5416.89 | 14344.58 | 6097.28 |
| 648 | | | | | | 10 | 16 | 11.5 | 3524.29 | 3019.47 | 3898.93 | 2231.43 |
| 649 | | | | | | | 4 | 5 | 37076.19 | 26564.83 | 30365.4 | 13012.84 |
| 650 | | | | | | 2 | 10 | 8 | 37726.81 | 32463.85 | 30956.17 | 14679.99 |
| 651 | | | | | | | 16 | 11 | 42546.86 | 26182.84 | 34960.59 | 14711.67 |
| 652 | 1600 | 0 | 0 | 4x6 | 2 on 1 | | 10 | 6 | 33262.46 | 26719.79 | 27782.62 | 11617.73 |
| 653 | | | | | | 6 | 16 | 9 | 33595.22 | 25212.63 | 28458.88 | 11659.54 |
| 654 | | | | | | 10 | 16 | 7 | 26039.04 | 23235.8 | 22138.21 | 9083.68 |
| 655 | | | | | | | 4 | 4.5 | 12744.32 | 5427.45 | 31824.24 | 4634.5 |
| 656 | | | | | 4 on 1 | 2 | 10 | 6 | 11666.47 | 5388.25 | 11460.53 | 4645.07 |
| 657 | | | | | | | 16 | 7.5 | 10656.71 | 6697.37 | 11724.26 | 4649.74 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 658 | | | | | | | 10 | 5 | 9707.56 | 4927.1 | 8657.87 | 3681.39 |
| 659 | | | | 4x6 | 4 on 1 | 6 | 16 | 6.5 | 8846.12 | 5982.2 | 8979.36 | 3686.06 |
| 660 | | | | | | 10 | 16 | 5.5 | 7258.21 | 4335.26 | 6720.57 | 2874.22 |
| 661 | | | | | | | 4 | 9 | 39462.95 | 30414.09 | 33951.07 | 14660.43 |
| 662 | | | | | | 2 | 10 | 12 | 39705.17 | 35151.61 | 33626.69 | 14706.04 |
| 663 | | | | | | | 16 | 15 | 41725.3 | 22266.5 | 34954.65 | 14722.83 |
| 664 | | | | | 2 on 1 | | 10 | 10 | 31419.54 | 27042.28 | 27156.57 | 11651.19 |
| 665 | | | | | | 6 | 16 | 13 | 31560.08 | 25394.93 | 27132.41 | 11670.88 |
| 666 | | | | 8x10 | | 10 | 16 | 11 | 24562.7 | 22914.99 | 21421.59 | 9097.32 |
| 667 | | | | | | | 4 | 8.5 | 7862.26 | 4132.73 | 9677.9 | 4646.75 |
| 668 | | | | | | 2 | 10 | 10 | 7332.66 | 4125.32 | 9677.05 | 4650.53 |
| 669 | | | 0 | | 4 on 1 | | 16 | 11.5 | 10692 | 6935.04 | 15222.7 | 6975.22 |
| 670 | | | | | | | 10 | 9 | 6016.98 | 3621.64 | 7512.86 | 3686.85 |
| 671 | | | | | | 6 | 16 | 10.5 | 5621.27 | 3863.81 | 7579.88 | 3688.73 |
| 672 | 1600 | 0 | | | | 10 | 16 | 9.5 | 4543.73 | 3086.99 | 5753.84 | 2876.9 |
| 673 | | | | | | | 4 | 11 | 33694.45 | 25162.78 | 29113.61 | 12772.79 |
| 674 | | | | | | 2 | 10 | 14 | 34442 | 29354.49 | 29636.42 | 12973.83 |
| 675 | | | | | 2 on 1 | | 16 | 17 | 39705.84 | 24564.22 | 33665.87 | 14660.43 |
| 676 | | | | | | | 10 | 12 | 27070.25 | 17416.88 | 23880.26 | 10228.64 |
| 677 | | | | | | 6 | 16 | 15 | 27563.58 | 21298.51 | 24152.36 | 10329.42 |
| 678 | | | | 10x12 | | 10 | 16 | 13 | 21337.24 | 19147.89 | 19075.59 | 8023.94 |
| 679 | | | | | | | 4 | 10.5 | 8548.29 | 4321.92 | 9091.89 | 4557.31 |
| 680 | | | | | | 2 | 10 | 12 | 8206.34 | 4403.17 | 9591.95 | 4600.62 |
| 681 | | | | | 4 on 1 | | 16 | 13.5 | 7844.88 | 5573.77 | 9990.25 | 4623.56 |
| 682 | | | | | | | 10 | 11 | 6716.02 | 3851.28 | 7098.1 | 3636.93 |
| 683 | | | | | | 6 | 16 | 12.5 | 6438.99 | 4727.09 | 7555.08 | 3659.88 |
| 684 | | | | | | 10 | 16 | 11.5 | 5210.76 | 3295.95 | 5591.26 | 2848.04 |
| 685 | | | | | | | 4 | 5 | 92961.85 | 61372.34 | 18935.02 | 33394.59 |
| 686 | | | 5 | 4x6 | 2 on 1 | 2 | 10 | 8 | 93073.35 | 76759.89 | 78223.7 | 37626.77 |
| 687 | | | | | | | 16 | 11 | 105604.55 | 54431.19 | 87766.71 | 37685.25 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 688 | | | | | | | 10 | 6 | 82144.9 | 62297.16 | 70143.41 | 29317.52 |
| 689 | | | | | 2 on 1 | 6 | 16 | 9 | 82080.97 | 56940.43 | 70689.43 | 29387.08 |
| 690 | | | | 4x6 | | 10 | 16 | 7 | 62986.51 | 54348.29 | 54932.4 | 22606.68 |
| 691 | | | | | | | 4 | 4.5 | 25573.25 | 10287.07 | 80089.45 | 11881.18 |
| 692 | | | | | | 2 | 10 | 6 | 22484.06 | 10257.01 | 29142.13 | 11897.07 |
| 693 | | | | | 4 on 1 | | 16 | 7.5 | 20113.85 | 11210.68 | 29072.33 | 11906.79 |
| 694 | | | | | | | 10 | 5 | 18315.46 | 9054.71 | 21952.67 | 9276.75 |
| 695 | | | | | | 6 | 16 | 6.5 | 16204.03 | 11146.14 | 21790.43 | 9286.44 |
| 696 | | | | | | 10 | 16 | 5.5 | 12975.78 | 7757.54 | 16325.39 | 7147.36 |
| 697 | | | | | | | 4 | 9 | 101621.8 | 72046.15 | 89308.11 | 37601.12 |
| 698 | | | | | | 2 | 10 | 12 | 102011.73 | 8245.67 | 82457.67 | 37673.98 |
| 699 | | | | | | | 16 | 15 | 107240.02 | 46380.06 | 90293.17 | 37701.96 |
| 700 | | | | | 2 on 1 | | 10 | 10 | 79449.8 | 64548.23 | 69474.12 | 29367.36 |
| 701 | | | | | | 6 | 16 | 13 | 79732.32 | 59219.71 | 69415.67 | 29403.63 |
| 702 | 1600 | 0 | 5 | 8x10 | | 10 | 16 | 11 | 61330.65 | 54973.89 | 54536.04 | 22630.46 |
| 703 | | | | | | | 4 | 8.5 | 17216.99 | 8883.55 | 28600.04 | 11901.17 |
| 704 | | | | | | 2 | 10 | 10 | 15943.31 | 8951.86 | 28425.36 | 11908 |
| 705 | | | | | 4 on 1 | | 16 | 11.5 | 26003.46 | 16884.67 | 4941.41 | 19304.48 |
| 706 | | | | | | | 10 | 9 | 12778.87 | 7760.61 | 21682.79 | 9281.63 |
| 707 | | | | | | 6 | 16 | 10.5 | 11868.42 | 7642.14 | 21837.24 | 9290.02 |
| 708 | | | | | | 10 | 16 | 9.5 | 9361.01 | 6491.04 | 16230.12 | 7150.91 |
| 709 | | | | | | | 4 | 11 | 86939.02 | 59545.49 | 77716.11 | 33022.27 |
| 710 | | | | | | 2 | 10 | 14 | 88196.94 | 70746.83 | 78123.72 | 33336.54 |
| 711 | | | | | 2 on 1 | | 16 | 17 | 101932.98 | 52807.04 | 87713.44 | 37601.12 |
| 712 | | | | | | | 10 | 12 | 68423.83 | 41275.36 | 61810.14 | 25905.34 |
| 713 | | | | | | 6 | 16 | 15 | 69152.2 | 49164.69 | 62381.41 | 26079.1 |
| 714 | | | | 10x12 | | 10 | 16 | 13 | 52926.78 | 45866.4 | 48764.83 | 20017.13 |
| 715 | | | | | | | 4 | 10.5 | 18920.51 | 8974.42 | 27104.64 | 11759.14 |
| 716 | | | | | 4 on 1 | 2 | 10 | 12 | 17224.3 | 8987.62 | 27237.76 | 11818.07 |
| 717 | | | | | | | 16 | 13.5 | 15966.99 | 9578.4 | 27386.84 | 11858.4 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 718 | | | | | | | 10 | 11 | 13882.41 | 7830.92 | 19612.43 | 9199.74 |
| 719 | | | 5 | 10x12 | 4 on 1 | 6 | 16 | 12.5 | 12744.33 | 9239.08 | 20187.48 | 9238.14 |
| 720 | | | | | | 10 | 16 | 11.5 | 10097.73 | 6625.55 | 14642.63 | 7099.47 |
| 721 | | | | | | | 4 | 5 | 74765.91 | 50497.71 | 74452.98 | 28195.26 |
| 722 | | | | | | 2 | 10 | 8 | 75385.38 | 60023.86 | 75121.1 | 28425.46 |
| 723 | | | | | | | 16 | 11 | 101932.98 | 52807.04 | 87713.44 | 37601.12 |
| 724 | | | | | 2 on 1 | | 10 | 6 | 68423.83 | 41275.36 | 61810.14 | 25905.34 |
| 725 | | | | | | 6 | 16 | 9 | 58614.88 | 41037.05 | 57512.69 | 22090.29 |
| 726 | | | | 4x6 | | 10 | 16 | 7 | 44327.69 | 37940.11 | 43684.43 | 16729.18 |
| 727 | | | | | | | 4 | 4.5 | 16628.03 | 7348372 | 31983.34 | 10023.88 |
| 728 | | | | | | 2 | 10 | 6 | 15090.11 | 7383.67 | 32101 | 10076.47 |
| 729 | | | | | 4 on 1 | | 16 | 7.5 | 13595.61 | 7773.95 | 31843.25 | 10099.37 |
| 730 | | | | | | | 10 | 5 | 12142.85 | 6274.39 | 22915.12 | 7807.96 |
| 731 | | | | | | 6 | 16 | 6.5 | 10821.44 | 7431.36 | 23368.28 | 7830.69 |
| 732 | | | 10 | | | 10 | 16 | 5.5 | 8490.21 | 5210.74 | 16437.9 | 5936.77 |
| 733 | | | | | | | 4 | 9 | 79381.02 | 51356.36 | 75412.51 | 28459.19 |
| 734 | 1600 | 0 | | | | 2 | 10 | 12 | 79353.16 | 63660.55 | 75221.95 | 32020.22 |
| 735 | | | | | | | 16 | 15 | 89909.11 | 44061.73 | 83905.84 | 32062.09 |
| 736 | | | | | 2 on 1 | | 10 | 10 | 69650.06 | 51615.28 | 64635.31 | 24821.57 |
| 737 | | | | | | 6 | 16 | 13 | 68526.4 | 47712.03 | 64382.7 | 24866.69 |
| 738 | | | | 8x10 | | 10 | 16 | 11 | 52630.71 | 44483.36 | 49211.89 | 18865.01 |
| 739 | | | | | | | 4 | 8.5 | 21165.65 | 7737.4 | 76332.91 | 10111.18 |
| 740 | | | | | | 2 | 10 | 10 | 18505.21 | 7633.37 | 33606.43 | 10122.82 |
| 741 | | | | | 4 on 1 | | 16 | 11.5 | 16256.4 | 8240.49 | 33472.41 | 10128.88 |
| 742 | | | | | | | 10 | 9 | 15021.48 | 6645.4 | 25025.93 | 7853.4 |
| 743 | | | | | | 6 | 16 | 10.5 | 13036.94 | 8358.5 | 24409.14 | 7858.61 |
| 744 | | | | | | 10 | 16 | 9.5 | 10331.19 | 5583.97 | 18280.01 | 5963.89 |
| 745 | | | | | | | 4 | 11 | 86690.87 | 59154.14 | 83996.95 | 32000.29 |
| 746 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 86957.54 | 69971.53 | 83170.32 | 32053.68 |
| 747 | | | | | | | 16 | 17 | 91358.6 | 37971.09 | 85535.98 | 32071.96 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 748 | | | | | | | 10 | 12 | 67344.02 | 52651.08 | 64304.78 | 24858.35 |
| 749 | | | | | 2 on 1 | 6 | 16 | 15 | 67502.05 | 48245.52 | 64436.36 | 24879.42 |
| 750 | | | | | | 10 | 16 | 13 | 51201.26 | 44423.79 | 49287.65 | 18878.73 |
| 751 | | | | | | | 4 | 10.5 | 14453.65 | 7145.42 | 33607.69 | 10124.78 |
| 752 | | | | | | 2 | 10 | 12 | 13280.6 | 7158.73 | 33507.18 | 10129.9 |
| 753 | | 0 | 10 | 10x12 | 4 on 1 | | 16 | 13.5 | 22326.23 | 14340.79 | 59133.63 | 17746.31 |
| 754 | | | | | | | 10 | 11 | 10596.46 | 6084.39 | 25120.9 | 7859.64 |
| 755 | | | | | | 6 | 16 | 12.5 | 979.25 | 5994.96 | 25273.54 | 7860.98 |
| 756 | | | | | | 10 | 16 | 11.5 | 7623.65 | 5034.26 | 18687.4 | 5966.25 |
| 757 | | | | | | | 4 | 5 | 45513.22 | 33988.96 | 39325.6 | 17253.02 |
| 758 | | | | | | 2 | 10 | 8 | 46522.99 | 39650.97 | 40031.79 | 17524.57 |
| 759 | | | | | | | 16 | 11 | 53633.19 | 33180.45 | 45474.62 | 19802.77 |
| 760 | | | | | 2 on 1 | | 10 | 6 | 36565.51 | 23526.09 | 32256.25 | 13816.47 |
| 761 | | | | | | 6 | 16 | 9 | 37231.87 | 28769.25 | 32624.12 | 13952.59 |
| 762 | | | | 4x6 | | 10 | 16 | 7 | 28821.56 | 25864.27 | 25766.61 | 10838.44 |
| 763 | | | | | | | 4 | 4.5 | 11546.71 | 5837.89 | 12281 | 6155.85 |
| 764 | | | | | | 2 | 10 | 6 | 11084.83 | 5947.63 | 12956.46 | 6214.35 |
| 765 | 1600 | 3 | 0 | | 4 on 1 | | 16 | 7.5 | 10596.57 | 7221.49 | 13494.47 | 6245.34 |
| 766 | | | | | | | 10 | 5 | 9071.75 | 5202.17 | 9587.86 | 4912.63 |
| 767 | | | | | | 6 | 16 | 6.5 | 8697.55 | 3685.18 | 10205.12 | 4943.63 |
| 768 | | | | | | 10 | 16 | 5.5 | 7038.51 | 4533.7 | 7552.47 | 3847.03 |
| 769 | | | | | | | 4 | 9 | 50081.16 | 35882.8 | 41016.47 | 17577.26 |
| 770 | | | | | | 2 | 10 | 12 | 37726.81 | 32463.85 | 30956.17 | 14679.99 |
| 771 | | | | | | | 16 | 15 | 54740.73 | 35366.82 | 47223.47 | 19871.98 |
| 772 | | | | | 2 on 1 | | 10 | 10 | 44929.71 | 36092.09 | 37527.74 | 15692.81 |
| 773 | | | | | | 6 | 16 | 13 | 45379.19 | 34228.28 | 38035.92 | 15749.28 |
| 774 | | | | 8x10 | | 10 | 16 | 11 | 35172.59 | 31386.06 | 29903.49 | 12269.9 |
| 775 | | | | | | | 4 | 8.5 | 17214.56 | 7331.19 | 42987.01 | 6260.11 |
| 776 | | | | | 4 on 1 | 2 | 10 | 10 | 15758.64 | 7278.25 | 15480.46 | 6274.39 |
| 777 | | | | | | | 16 | 11.5 | 14394.7 | 9046.56 | 15836.69 | 6280.69 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 778 | | | | | | | 10 | 9 | 13112.62 | 6655.35 | 11694.73 | 4972.68 |
| 779 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 11949.02 | 8080.54 | 12128.99 | 4978.99 |
| 780 | | | | | | 10 | 16 | 9.5 | 9804.13 | 5855.91 | 9077.9 | 3882.4 |
| 781 | | | | | | | 4 | 11 | 53305.1 | 41082.24 | 45859.86 | 19802.77 |
| 782 | | | | | | 2 | 10 | 14 | 53632.29 | 47481.51 | 45421.7 | 19864.37 |
| 783 | | | 0 | | 2 on 1 | | 16 | 17 | 56361 | 30076.77 | 47215.46 | 19887.06 |
| 784 | | | | | | | 10 | 12 | 42440.36 | 36554.88 | 36681.1 | 15738 |
| 785 | | | | | | 6 | 16 | 15 | 42630.2 | 34302.54 | 36649.46 | 15764.6 |
| 786 | | | | 10x12 | | 10 | 16 | 13 | 33178.39 | 30990.74 | 28935.5 | 12288.33 |
| 787 | | | | | | | 4 | 10.5 | 10620.05 | 5582.34 | 13072.55 | 6276.66 |
| 788 | | | | | | 2 | 10 | 12 | 9904.69 | 5572.33 | 13071.41 | 6281.76 |
| 789 | | | | | 4 on 1 | | 16 | 13.5 | 14442.37 | 9367.6 | 20562.27 | 9421.87 |
| 790 | | | | | | | 10 | 11 | 8127.51 | 4891.98 | 10148.1 | 4980.07 |
| 791 | | | | | | 6 | 16 | 12.5 | 7593 | 5219.09 | 10238.63 | 4982.6 |
| 792 | 1600 | 3 | | | | 10 | 16 | 11.5 | 13745.45 | 5799.82 | 12455.4 | 3828.74 |
| 793 | | | | | | | 4 | 5 | 117434.04 | 80431.86 | 104976.07 | 44605.27 |
| 794 | | | | | | 2 | 10 | 8 | 119133.18 | 95562.21 | 105526.65 | 45029.78 |
| 795 | | | | | | | 16 | 11 | 137687.33 | 71329.81 | 118480.09 | 50790.21 |
| 796 | | | | | 2 on 1 | | 10 | 6 | 92424.39 | 55753.24 | 83490.87 | 34991.98 |
| 797 | | | | | | 6 | 16 | 9 | 93273.17 | 66274.77 | 84262.52 | 35226.68 |
| 798 | | | 5 | 4x6 | | 10 | 16 | 7 | 71491.55 | 61954.64 | 65869.74 | 27038.4 |
| 799 | | | | | | | 4 | 4.5 | 25557.13 | 12122.31 | 36611.96 | 15883.81 |
| 800 | | | | | | 2 | 10 | 6 | 23265.95 | 12140.14 | 36791.77 | 15963.42 |
| 801 | | | | | 4 on 1 | | 16 | 7.5 | 21567.62 | 12938.15 | 36993.14 | 16017.89 |
| 802 | | | | | | | 10 | 5 | 18751.85 | 10577.72 | 26491.75 | 12426.67 |
| 803 | | | | | | 6 | 16 | 6.5 | 17214.57 | 12479.82 | 27268.5 | 12478.54 |
| 804 | | | | | | 10 | 16 | 5.5 | 13639.64 | 8949.55 | 19778.73 | 9589.71 |
| 805 | | | | | | | 4 | 9 | 125569.45 | 82899.5 | 106622.52 | 45108.18 |
| 806 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 93073.35 | 76759.59 | 78223.7 | 37626.77 |
| 807 | | | | | | | 16 | 15 | 142646.75 | 73523.65 | 118552.05 | 50903.84 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 808 | | | | | | | 10 | 10 | 110958.31 | 84148.72 | 94747.15 | 39601.03 |
| 809 | | | | | 2 on 1 | 6 | 16 | 13 | 110871.95 | 76913.04 | 95484.69 | 39694.99 |
| 810 | | | | 8x10 | | 10 | 16 | 11 | 85079.87 | 73411.67 | 74200.66 | 30536.27 |
| 811 | | | | | | | 4 | 8.5 | 34543.4 | 13895.39 | 108181.88 | 16048.66 |
| 812 | | | | | | 2 | 10 | 10 | 30370.64 | 13854.8 | 39364.12 | 16070.13 |
| 813 | | | | | 4 on 1 | | 16 | 11.5 | 27169.04 | 45442.98 | 39269.84 | 16083.25 |
| 814 | | | | | | | 10 | 9 | 24739.85 | 12230.77 | 29652.86 | 12530.69 |
| 815 | | | | | | 6 | 16 | 10.5 | 21887.81 | 15055.8 | 29433.71 | 12543.78 |
| 816 | | | | | | 10 | 16 | 9.5 | 17527.21 | 10478.61 | 22051.73 | 9654.39 |
| 817 | | | | | | | 4 | 11 | 137266.98 | 97317.29 | 120634.12 | 50790.21 |
| 818 | | | | | | 2 | 10 | 14 | 137793.7 | 111380.79 | 118662.38 | 50888.63 |
| 819 | 1600 | 3 | 5 | | 2 on 1 | | 16 | 17 | 144855.88 | 62648.48 | 121964.7 | 50926.42 |
| 820 | | | | | | | 10 | 12 | 107317.87 | 87189.38 | 93843.09 | 39668.36 |
| 821 | | | | | | 6 | 16 | 15 | 107699.48 | 79991.8 | 93764.13 | 39717.34 |
| 822 | | | | 10x12 | | 10 | 16 | 13 | 82843.19 | 74256.7 | 73665.28 | 30567.38 |
| 823 | | | | | | | 4 | 10.5 | 23256.08 | 11999.58 | 38631.88 | 16075.66 |
| 824 | | | | | | 2 | 10 | 12 | 21535.64 | 12091.85 | 38395.93 | 16084.89 |
| 825 | | | | | 4 on 1 | | 16 | 13.5 | 35124.51 | 22807.19 | 66851.18 | 26075.78 |
| 826 | | | | | | | 10 | 11 | 17261.23 | 10482.75 | 29288.31 | 12545.39 |
| 827 | | | | | | 6 | 16 | 12.5 | 16037.43 | 10322.72 | 29496.94 | 12548.61 |
| 828 | | | | | | 10 | 16 | 11.5 | 12644.51 | 8768.86 | 21923.05 | 9659.18 |
| 829 | | | | | | | 4 | 5 | 100991.05 | 68210.45 | 100568.35 | 38085.12 |
| 830 | | | | | | 2 | 10 | 8 | 101827.79 | 81078.03 | 101470.82 | 38396.07 |
| 831 | | | | | | | 16 | 11 | 137687.33 | 71329.81 | 118480.09 | 50790.21 |
| 832 | | | | | 2 on 1 | | 10 | 6 | 92424.39 | 55753.24 | 83490.87 | 34991.98 |
| 833 | | | | | | 6 | 16 | 9 | 79174.83 | 55431.33 | 77686.02 | 29838.74 |
| 834 | | | 10 | 4x6 | | 10 | 16 | 7 | 59876.21 | 51248.11 | 59007.32 | 22597.16 |
| 835 | | | | | | | 4 | 4.5 | 22460.54 | 9926.38 | 43201.92 | 13539.89 |
| 836 | | | | | 4 on 1 | 2 | 10 | 6 | 20383.16 | 9973.59 | 43360.85 | 13610.93 |
| 837 | | | | | | | 16 | 7.5 | 20383.16 | 9973.59 | 43360.85 | 13610.93 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension Acc. Cost ($)** | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 838 | | | | | | | 10 | 5 | 16402.12 | 8475.22 | 30952.9 | 10546.7 |
| 839 | | | | 4x6 | 4 on 1 | 6 | 16 | 6.5 | 14617.21 | 10038 | 31565.01 | 10577.41 |
| 840 | | | | | | 10 | 16 | 5.5 | 11468.27 | 7038.48 | 22203.71 | 8019.17 |
| 841 | | | | | | | 4 | 9 | 107224.97 | 69370.27 | 101864.45 | 38441.62 |
| 842 | | | | | | 2 | 10 | 12 | 79353.16 | 63660.55 | 75221.95 | 32020.22 |
| 843 | | | | | | | 16 | 15 | 121455.91 | 59515.62 | 113336.92 | 43308.29 |
| 844 | | | | | 2 on 1 | | 10 | 10 | 94080.74 | 69720.02 | 87307 | 33528.07 |
| 845 | | | | | | 6 | 16 | 13 | 93913.7 | 64447.65 | 86965.79 | 33589.01 |
| 846 | 1600 | 3 | 10 | 8x10 | | 10 | 16 | 11 | 71091.62 | 60086.49 | 66473.62 | 25482.16 |
| 847 | | | | | | | 4 | 8.5 | 28589.79 | 10451.4 | 103107.68 | 13657.82 |
| 848 | | | | | | 2 | 10 | 10 | 25000.22 | 10310.87 | 45394.34 | 13673.54 |
| 849 | | | | | 4 on 1 | | 16 | 11.5 | 21958.54 | 11130.95 | 45213.3 | 13681.71 |
| 850 | | | | | | | 10 | 9 | 20290.46 | 8976.36 | 33804.11 | 10608.09 |
| 851 | | | | | | 6 | 16 | 10.5 | 17609.82 | 11290.36 | 32970.97 | 10615.12 |
| 852 | | | | | | 10 | 16 | 9.5 | 13955 | 7542.62 | 24691.97 | 8055.8 |
| 853 | | | | | | | 4 | 11 | 117098.84 | 79903.24 | 113459.99 | 43224.82 |
| 854 | | | | | | 2 | 10 | 14 | 117459.05 | 94514.97 | 112343.41 | 43296.93 |
| 855 | | | | | 2 on 1 | | 16 | 17 | 123403.84 | 51289.95 | 115538.86 | 43321.62 |
| 856 | | | | | | | 10 | 12 | 90965.82 | 71119.15 | 86860.53 | 33577.74 |
| 857 | | | | | | 6 | 16 | 15 | 91179.29 | 65168.28 | 87038.27 | 33606.21 |
| 858 | | | | 10x12 | | 10 | 16 | 13 | 69160.77 | 60006.02 | 66575.95 | 25500.7 |
| 859 | | | | | | | 4 | 10.5 | 19523.46 | 9651.78 | 45396.03 | 13676.18 |
| 860 | | | | | | 2 | 10 | 12 | 17938.95 | 9669.75 | 45260.27 | 13683.09 |
| 861 | | | | | 4 on 1 | | 16 | 13.5 | 30157.46 | 19371.02 | 19875.53 | 23971.06 |
| 862 | | | | | | | 10 | 11 | 14313.31 | 8218.58 | 33932.39 | 10616.51 |
| 863 | | | | | | 6 | 16 | 12.5 | 13228.37 | 8097.77 | 34138.57 | 10618.33 |
| 864 | | | | | | 10 | 16 | 11.5 | 6137.51 | 4169.79 | 7772.07 | 3886.01 |
| 865 | | | | | | | 4 | 5 | 52915.06 | 39516.6 | 45721.14 | 20058.59 |
| 866 | 3000 | 0 | 0 | 4x6 | 2 on 1 | 2 | 10 | 8 | 54089.05 | 46099.43 | 46542.08 | 20374.6 |
| 867 | | | | | | | 16 | 11 | 62355.58 | 38576.59 | 52870.18 | 23023.3 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 868 | | | | | | | 10 | 6 | 42512.17 | 27352.15 | 37505.48 | 16063.45 |
| 869 | | | | | 2 on 1 | 6 | 16 | 9 | 43286.91 | 33448 | 37828.8 | 16221.71 |
| 870 | | | | | | 10 | 16 | 7 | 33508.82 | 30070.59 | 29957.04 | 12601.1 |
| 871 | | | | | | | 4 | 4.5 | 13424.56 | 6787.31 | 14278.26 | 7156.98 |
| 872 | | | | 4x6 | | 2 | 10 | 6 | 12887.56 | 6914.9 | 15063.57 | 7224.99 |
| 873 | | | | | | | 16 | 7.5 | 12319.9 | 8395.93 | 15689.08 | 7261.02 |
| 874 | | | | | 4 on 1 | | 10 | 5 | 10547.09 | 6048.2 | 11147.14 | 5711.57 |
| 875 | | | | | | 6 | 16 | 6.5 | 10112.03 | 7423.6 | 11764.78 | 5747.62 |
| 876 | | | | | | 10 | 16 | 5.5 | 8183.18 | 5271.02 | 8780.73 | 4472.68 |
| 877 | | | | | | | 4 | 9 | 58225.88 | 41718.44 | 47687 | 20435.86 |
| 878 | | | | | | 2 | 10 | 12 | 37726.81 | 32463.85 | 30956.17 | 14679.99 |
| 879 | | | | | | | 16 | 15 | 66817.23 | 41118.54 | 54903.45 | 23103.78 |
| 880 | | | | | 2 on 1 | | 10 | 10 | 52236.65 | 41961.77 | 43630.89 | 18244.94 |
| 881 | | | | | | 6 | 16 | 13 | 52759.23 | 39794.84 | 44221.8 | 18310.59 |
| 882 | 3000 | 0 | 0 | 8x10 | | 10 | 16 | 11 | 40891.72 | 36490.39 | 34766.71 | 14265.36 |
| 883 | | | | | | | 4 | 8.5 | 20014.18 | 8523.47 | 49978.01 | 7278.19 |
| 884 | | | | | | 2 | 10 | 10 | 18321.48 | 8461.92 | 17998.05 | 7294.79 |
| 885 | | | | | 4 on 1 | | 16 | 11.5 | 16735.71 | 10517.81 | 18412.22 | 7302.13 |
| 886 | | | | | | | 10 | 9 | 15245.13 | 7737.72 | 13596.65 | 5781.39 |
| 887 | | | | | | 6 | 16 | 10.5 | 13892.29 | 9394.68 | 14101.53 | 5788.73 |
| 888 | | | | | | 10 | 16 | 9.5 | 11398.58 | 6808.26 | 10554.24 | 4513.79 |
| 889 | | | | | | | 4 | 11 | 61974.14 | 47763.46 | 53318.08 | 23023.3 |
| 890 | | | | | | 2 | 10 | 14 | 62354.54 | 55203.45 | 52808.66 | 23094.93 |
| 891 | | | | | 2 on 1 | | 16 | 17 | 65527.02 | 34968.17 | 54894.13 | 23121.31 |
| 892 | | | | | | | 10 | 12 | 49342.46 | 42499.82 | 42647.73 | 18297.48 |
| 893 | | | | | | 6 | 16 | 15 | 49563.17 | 39881.18 | 42609.79 | 18328.4 |
| 894 | | | | 10x12 | | 10 | 16 | 13 | 38574.21 | 36030.77 | 33641.29 | 14286.78 |
| 895 | | | | | | | 4 | 10.5 | 12347.19 | 6490.2 | 15198.54 | 7297.44 |
| 896 | | | | | 4 on 1 | 2 | 10 | 12 | 11515.49 | 6478.57 | 15197.22 | 7303.37 |
| 897 | | | | | | | 16 | 13.5 | 16791.13 | 10891.06 | 23906.32 | 10954.15 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 898 | | | | | | | 10 | 11 | 9449.29 | 5687.56 | 11798.49 | 5789.98 |
| 899 | | | 0 | 10x12 | 4 on 1 | 6 | 16 | 12.5 | 8827.85 | 6067.88 | 11903.74 | 5792.93 |
| 900 | | | | | | 10 | 16 | 11.5 | 7135.65 | 4847.93 | 9136.05 | 4517.99 |
| 901 | | | | | | | 4 | 5 | 136532.39 | 93512.53 | 122048.38 | 51859.45 |
| 902 | | | | | | 2 | 10 | 8 | 138507.86 | 111103.54 | 122688.49 | 52352.99 |
| 903 | | | | | | | 16 | 11 | 160079.48 | 82930.22 | 137748.56 | 59050.25 |
| 904 | | | | | 2 on 1 | | 10 | 6 | 107455.41 | 64820.41 | 97069.03 | 40682.75 |
| 905 | | | | | | 6 | 16 | 9 | 108442.23 | 77053.08 | 97966.17 | 40955.62 |
| 906 | | | | 4x6 | | 10 | 16 | 7 | 83118.25 | 72030.36 | 76582.16 | 31435.67 |
| 907 | | | | | | | 4 | 4.5 | 29713.5 | 14093.77 | 42566.18 | 18467.01 |
| 908 | | | | | | 2 | 10 | 6 | 27049.7 | 14114.5 | 42775.23 | 18559.56 |
| 909 | | | | | 4 on 1 | | 16 | 7.5 | 25075.18 | 15042.29 | 43009.35 | 18622.88 |
| 910 | | | | | | | 10 | 5 | 21801.47 | 12297.98 | 30800.11 | 14447.63 |
| 911 | | | | | | 6 | 16 | 6.5 | 20014.18 | 14509.41 | 31703.2 | 14507.93 |
| 912 | 3000 | 0 | 5 | | | 10 | 16 | 5.5 | 15857.86 | 10405.02 | 22995.36 | 11149.28 |
| 913 | | | | | | | 4 | 9 | 145990.88 | 96381.48 | 123962.59 | 52444.14 |
| 914 | | | | | | 2 | 10 | 12 | 146165.98 | 120546.7 | 122845.5 | 59090.53 |
| 915 | | | | | 2 on 1 | | 16 | 15 | 165845.45 | 85480.84 | 137832.22 | 59182.36 |
| 916 | | | | | | | 10 | 10 | 129003.52 | 97833.87 | 110155.92 | 46041.37 |
| 917 | | | | | | 6 | 16 | 13 | 128903.12 | 89421.45 | 111013.41 | 46150.61 |
| 918 | | | | 8x10 | | 10 | 16 | 11 | 98916.45 | 85350.65 | 86267.95 | 35502.39 |
| 919 | | | | | | | 4 | 8.5 | 40161.21 | 16155.21 | 125775.55 | 18658.66 |
| 920 | | | | | | 2 | 10 | 10 | 35309.84 | 16108.01 | 45765.93 | 18683.62 |
| 921 | | | | | 4 on 1 | | 16 | 11.5 | 31587.56 | 17605.69 | 45656.31 | 18698.88 |
| 922 | | | | | | | 10 | 9 | 28763.3 | 14219.86 | 34475.32 | 14568.56 |
| 923 | | | | | | 6 | 16 | 10.5 | 25447.44 | 17504.33 | 34220.53 | 14583.78 |
| 924 | | | | | | 10 | 16 | 9.5 | 20377.67 | 12182.75 | 25638.01 | 11224.49 |
| 925 | | | | | | | 4 | 11 | 159590.78 | 113144.05 | 140252.91 | 59050.25 |
| 926 | | | | 10x12 | 2 on 1 | 2 | 10 | 14 | 160203.16 | 129494.7 | 137960.48 | 59164.68 |
| 927 | | | | | | | 16 | 17 | 168413.84 | 72837.04 | 141799.88 | 59208.61 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 928 | | | | | | | 10 | 12 | 124771.02 | 101369.03 | 109104.84 | 46119.64 |
| 929 | | | | | 2 on 1 | 6 | 16 | 15 | 125214.7 | 93000.91 | 109013.04 | 46176.59 |
| 930 | | | | | | 10 | 16 | 13 | 96316.02 | 86333.11 | 85645.51 | 35539.74 |
| 931 | | | 5 | 10x12 | | | 4 | 10.5 | 27038.22 | 13951.07 | 44914.61 | 18690.05 |
| 932 | | | | | | 2 | 10 | 12 | 25037.99 | 14058.35 | 44640.28 | 18700.79 |
| 933 | | | | | 4 on 1 | | 16 | 13.5 | 40836.83 | 26516.34 | 77723.21 | 30316.49 |
| 934 | | | | | | | 10 | 11 | 20068.43 | 12187.57 | 34051.48 | 14585.65 |
| 935 | | | | | | 6 | 16 | 12.5 | 18638.63 | 12001.51 | 34294.04 | 14589.4 |
| 936 | | | | | | 10 | 16 | 11.5 | 14700.9 | 10193.78 | 25488.41 | 11230.06 |
| 937 | | | | | | | 4 | 5 | 117415.27 | 79303.55 | 116923.84 | 44278.93 |
| 938 | | | | | | 2 | 10 | 8 | 118388.09 | 94263.79 | 117973.07 | 44640.45 |
| 939 | | | | | | | 16 | 11 | 160079.48 | 82930.22 | 137748.56 | 59050.25 |
| 940 | | | | | 2 on 1 | | 10 | 6 | 107455.41 | 64820.41 | 97069.03 | 40682.75 |
| 941 | | | | | | 6 | 16 | 9 | 92051.07 | 64446.16 | 90320.14 | 34691.43 |
| 942 | | | | 4x6 | | 10 | 16 | 7 | 69613.91 | 59582.62 | 68603.72 | 26272.15 |
| 943 | | | | | | | 4 | 4.5 | 26113.3 | 11540.71 | 50227.87 | 15741.89 |
| 944 | | | | | | 2 | 10 | 6 | 23698.09 | 11595.6 | 50412.64 | 15824.48 |
| 945 | 3000 | 0 | 10 | | 4 on 1 | | 16 | 7.5 | 21351.07 | 12208.52 | 50007.87 | 15860.44 |
| 946 | | | | | | | 10 | 5 | 19069.61 | 9853.55 | 35986.78 | 12261.92 |
| 947 | | | | | | 6 | 16 | 6.5 | 16994.41 | 11670.49 | 36698.45 | 12297.62 |
| 948 | | | | | | 10 | 16 | 5.5 | 13333.36 | 8183.15 | 25814.71 | 9323.34 |
| 949 | | | | | | | 4 | 9 | 124663.02 | 80652 | 118430.71 | 44693.4 |
| 950 | | | | | | 2 | 10 | 12 | 124619.27 | 99974.98 | 118131.45 | 50285.79 |
| 951 | | | | | 2 on 1 | | 16 | 15 | 141196.72 | 69194.67 | 131768.97 | 50351.54 |
| 952 | | | | | | | 10 | 10 | 109381.14 | 81058.62 | 101505.79 | 38980.75 |
| 953 | | | | | | 6 | 16 | 13 | 109186.94 | 74928.8 | 101109.08 | 39051.61 |
| 954 | | | | 8x10 | | 10 | 16 | 11 | 82653.29 | 69858.39 | 77284.25 | 29626.33 |
| 955 | | | | | | | 4 | 8.5 | 33239.36 | 12151.12 | 119876.14 | 15878.99 |
| 956 | | | | | 4 on 1 | 2 | 10 | 10 | 29066.01 | 11987.73 | 52776.84 | 15897.27 |
| 957 | | | | | | | 16 | 11.5 | 25529.67 | 12941.18 | 52566.36 | 15906.78 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 958 | | | | | | | 10 | 9 | 23590.31 | 10436.19 | 39301.69 | 12333.29 |
| 959 | | | | 8x10 | 4 on 1 | 6 | 16 | 10.5 | 20473.71 | 13126.52 | 38333.05 | 12341.46 |
| 960 | | | | | | 10 | 16 | 9.5 | 16224.5 | 8769.28 | 28707.64 | 9365.92 |
| 961 | | | | | | | 4 | 11 | 136142.69 | 92897.95 | 131912.05 | 50254.49 |
| 962 | | | | | | 2 | 10 | 14 | 136561.47 | 109885.98 | 130613.88 | 50338.33 |
| 963 | | | | | 2 on 1 | | 16 | 17 | 143473.06 | 59631.26 | 134329 | 50367.04 |
| 964 | | | | | | | 10 | 12 | 105759.61 | 82685.29 | 100986.7 | 39038.5 |
| 965 | | | | | | 6 | 16 | 15 | 106007.83 | 75766.63 | 101193.35 | 39071.6 |
| 966 | | 0 | 10 | 10x12 | | 10 | 16 | 13 | 80408.43 | 69764.84 | 77403.23 | 29647.89 |
| 967 | | | | | | | 4 | 10.5 | 22698.57 | 11221.45 | 52778.81 | 15900.35 |
| 968 | | | | | | 2 | 10 | 12 | 20856.37 | 11242.35 | 52620.96 | 15908.38 |
| 969 | | | | | 4 on 1 | | 16 | 13.5 | 35061.98 | 22521.34 | 92865.73 | 27869.49 |
| 970 | | | | | | | 10 | 11 | 16641.09 | 9555.17 | 39450.83 | 12343.08 |
| 971 | | | | | | 6 | 16 | 12.5 | 15379.7 | 9414.71 | 39690.55 | 12345.19 |
| 972 | | | | | | 10 | 16 | 11.5 | 11972.47 | 7905.99 | 29347.41 | 9369.63 |
| 973 | 3000 | | | | | | 4 | 5 | 60146.71 | 44917.15 | 51969.64 | 22800.24 |
| 974 | | | | | | 2 | 10 | 8 | 61751.14 | 52399.62 | 52902.89 | 23159.1 |
| 975 | | | | | 2 on 1 | | 16 | 11 | 70877.43 | 43848.68 | 60095.7 | 26169.79 |
| 976 | | | | | | | 10 | 6 | 48322.11 | 31090.24 | 42627.78 | 18258.77 |
| 977 | | | | | | 6 | 16 | 9 | 49202.73 | 38019.19 | 43113.49 | 18438.66 |
| 978 | | 3 | 0 | 4x6 | | 10 | 16 | 7 | 38088.32 | 34180.2 | 34051.13 | 14323.23 |
| 979 | | | | | | | 4 | 4.5 | 15259.23 | 7714.9 | 16229.6 | 8135.09 |
| 980 | | | | | | 2 | 10 | 6 | 14648.84 | 7859.93 | 17122.24 | 8212.39 |
| 981 | | | | | 4 on 1 | | 16 | 7.5 | 14003.6 | 9543.36 | 17833.23 | 8253.35 |
| 982 | | | | | | | 10 | 5 | 11988.52 | 6874.78 | 12670.56 | 6492.15 |
| 983 | | | | | | 6 | 16 | 6.5 | 11494 | 8438.15 | 13486.29 | 6533.12 |
| 984 | | | | | | 10 | 16 | 5.5 | 9301.54 | 5991.38 | 9980.75 | 5083.93 |
| 985 | | | | | | | 4 | 9 | 66183.34 | 41419.9 | 54204.16 | 23228.73 |
| 986 | | | | 8x10 | 2 on 1 | 2 | 10 | 12 | 50960 | 43850.98 | 41814.46 | 19829.19 |
| 987 | | | | | | | 16 | 15 | 75948.82 | 46738.02 | 62406.85 | 26261.26 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 988 | | | | | | | 10 | 10 | 59375.59 | 17696.48 | 49593.72 | 20738.39 |
| 989 | | | | | 2 on 1 | 6 | 16 | 13 | 59969.59 | 45233.42 | 50265.38 | 20813.01 |
| 990 | | | | | | 10 | 16 | 11 | 46481.34 | 41477.37 | 39515.11 | 16214.94 |
| 991 | | | | | | | 4 | 8.5 | 22749.42 | 9688.33 | 56808.27 | 8272.87 |
| 992 | | | | | | 2 | 10 | 10 | 20825.39 | 9678.37 | 20457.76 | 8291.74 |
| 993 | | | | 8x10 | 4 on 1 | | 16 | 11.5 | 19022.91 | 1955.23 | 20928.54 | 8300.07 |
| 994 | | | | | | | 10 | 9 | 17328.62 | 8795.19 | 15454.84 | 6571.51 |
| 995 | | | | | | 6 | 16 | 10.5 | 15790.89 | 10678.61 | 16028.72 | 6579.84 |
| 996 | | | | | | 10 | 16 | 9.5 | 12956.37 | 7738.71 | 11996.64 | 5130.67 |
| 997 | | | | | | | 4 | 11 | 70443.85 | 54291317 | 60604.81 | 26169.79 |
| 998 | | | 0 | | | 2 | 10 | 14 | 70876.23 | 62747.85 | 60025.77 | 26251.2 |
| 999 | | | | | 2 on 1 | | 16 | 17 | 74482.3 | 39747.11 | 32396.25 | 26281.19 |
| 1000 | | | | | | | 10 | 12 | 56085.86 | 48308.07 | 48476.2 | 20798.11 |
| 1001 | | | | | | 6 | 16 | 15 | 56336.74 | 45331.55 | 48433.07 | 20833.26 |
| 1002 | 3000 | 3 | | 10x12 | | 10 | 16 | 13 | 43845.97 | 40954.93 | 38238.89 | 16239.29 |
| 1003 | | | | | | | 4 | 10.5 | 14034.63 | 7377.19 | 17275.66 | 8294.74 |
| 1004 | | | | | | 2 | 10 | 12 | 13089.26 | 7363.96 | 17274.15 | 8301.49 |
| 1005 | | | | | 4 on 1 | | 16 | 13.5 | 19085.9 | 12379.49 | 27173.48 | 12451.2 |
| 1006 | | | | | | | 10 | 11 | 10740.68 | 6464.86 | 13410.93 | 6581.27 |
| 1007 | | | | | | 6 | 16 | 12.5 | 10034.32 | 6897.14 | 13530.57 | 6584.62 |
| 1008 | | | | | | 10 | 16 | 11.5 | 8110.85 | 5510.47 | 10270.96 | 5135.44 |
| 1009 | | | | | | | 4 | 5 | 155191.62 | 106292.45 | 138728.16 | 58946.84 |
| 1010 | | | | | | 2 | 10 | 8 | 157437.08 | 126284.54 | 139455.75 | 59507.83 |
| 1011 | | | | | | | 16 | 11 | 181956.8 | 94263.9 | 156574 | 67120.38 |
| 1012 | | | | | 2 on 1 | | 10 | 6 | 122140.84 | 73679.11 | 110335 | 46242.66 |
| 1013 | | | | | | 6 | 16 | 9 | 123262.52 | 87583.55 | 111354.74 | 46552.83 |
| 1014 | | | 5 | 4x6 | | 10 | 16 | 7 | 94477.63 | 81874.41 | 87048.29 | 35731.84 |
| 1015 | | | | | | | 4 | 4.5 | 33774.31 | 16019.9 | 48383.5 | 20990.81 |
| 1016 | | | | | 4 on 1 | 2 | 10 | 6 | 30746.45 | 16043.46 | 18621.12 | 21096.01 |
| 1017 | | | | | | | 16 | 7.5 | 28502.08 | 17098.05 | 48887.23 | 21167.98 |
| 1018 | | | | | | 6 | 10 | 5 | 24780.97 | 13978.68 | 65009.42 | 16422.12 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1020 | | | | | | 10 | 16 | 5.5 | 18025.08 | 11827.02 | 26138.02 | 12673 |
| 1021 | | | | | | | 4 | 9 | 165942.75 | 109553.48 | 140903.98 | 59611.44 |
| 1022 | | | | | | 2 | 10 | 12 | 146165.98 | 120546.7 | 122845.5 | 59090.53 |
| 1023 | | | | | 2 on 1 | | 16 | 15 | 188510.78 | 97163.09 | 156669.11 | 67270.54 |
| 1024 | | | | | | | 10 | 10 | 146633.81 | 111204.36 | 125210.41 | 52333.62 |
| 1025 | | | | | | 6 | 16 | 13 | 146519.7 | 101642.26 | 126185.09 | 52457.79 |
| 1026 | | | | 8x10 | | 10 | 16 | 11 | 112434.89 | 97015.12 | 98057.79 | 40354.34 |
| 1027 | | | | | | | 4 | 8.5 | 45649.85 | 18363.06 | 142964.7 | 21208.65 |
| 1028 | | | | | | 2 | 10 | 10 | 40135.46 | 18309.42 | 52020.54 | 21237.02 |
| 1029 | | | | | 4 on 1 | | 16 | 11.5 | 35904.48 | 20011.77 | 51895.94 | 21254.36 |
| 1030 | | | | | | | 10 | 9 | 32694.25 | 16163.23 | 39186.9 | 16559.58 |
| 1031 | | | | | | 6 | 16 | 10.5 | 28925.22 | 19896.56 | 38897.29 | 16575.87 |
| 1032 | 3000 | 3 | 5 | | | 10 | 16 | 9.5 | 23162.59 | 13847.71 | 29141.84 | 12758.48 |
| 1033 | | | | | | | 4 | 11 | 181401.3 | 128606.91 | 159420.59 | 67120.38 |
| 1034 | | | | | | 2 | 10 | 14 | 182097.36 | 147192.12 | 156814.91 | 67250.43 |
| 1035 | | | | | 2 on 1 | | 16 | 17 | 191430.17 | 82791.34 | 161179 | 67311.37 |
| 1036 | | | | | | | 10 | 12 | 141822.89 | 115222.66 | 124015.68 | 52422.59 |
| 1037 | | | | | | 6 | 16 | 15 | 142327.2 | 105710.91 | 123911.34 | 52487.33 |
| 1038 | | | | 10x12 | | 10 | 16 | 13 | 109479.07 | 98131.84 | 97350.27 | 40396.79 |
| 1039 | | | | | | | 4 | 10.5 | 30733.41 | 15857.7 | 51052.88 | 21244.33 |
| 1040 | | | | | | 2 | 10 | 12 | 28459.81 | 15979.64 | 50741.05 | 21256.53 |
| 1041 | | | | | 4 on 1 | | 16 | 13.5 | 46417.8 | 30140.2 | 88345.28 | 34459.71 |
| 1042 | | | | | | | 10 | 11 | 22811.09 | 13853.19 | 38705.14 | 16579.01 |
| 1043 | | | | | | 6 | 16 | 12.5 | 21185.88 | 13641.7 | 38980.84 | 16583.26 |
| 1044 | | | | | | 10 | 16 | 11.5 | 16710 | 11586.92 | 28971.79 | 12764.82 |
| 1045 | | | | | | | 4 | 5 | 133461.86 | 90140.6 | 117242.99 | 50330.32 |
| 1046 | | | | | | 2 | 10 | 8 | 134567.64 | 107146.38 | 117209.84 | 50741.25 |
| 1047 | | | | | | | 16 | 11 | 181956.8 | 94263.9 | 140083.19 | 67120.38 |
| 1048 | | | 10 | 4x6 | 2 on 1 | 6 | 10 | 6 | 122140.84 | 73679.11 | 100855.94 | 46246.66 |
| 1049 | | | | | | | 16 | 9 | 104631.25 | 73253.71 | 91371.6 | 39432.55 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1050 | | | | | | 10 | 16 | 7 | 79127.71 | 67725.49 | 70508.52 | 29862.64 |
| 1051 | | | | | | | 4 | 4.5 | 29682.09 | 13117.93 | 40887.4 | 17893.26 |
| 1052 | | | | | | 2 | 10 | 6 | 26936.79 | 13180.32 | 40756.77 | 17987.13 |
| 1053 | | | | 4x6 | 4 on 1 | | 16 | 7.5 | 24269.02 | 13877 | 40800.6 | 18028.02 |
| 1054 | | | | | | | 10 | 5 | 21675.76 | 11200.19 | 29736.36 | 13937.7 |
| 1055 | | | | | | 6 | 16 | 6.5 | 19316.96 | 13265.44 | 29982.13 | 13978.27 |
| 1056 | | | | | | 10 | 16 | 5.5 | 15155.56 | 9301.5 | 21617.01 | 10597.51 |
| 1057 | | | | | | | 4 | 9 | 141700.12 | 91674.33 | 118642.13 | 50801.44 |
| 1058 | | | | | | 2 | 10 | 12 | 124619.27 | 99974.98 | 118131.45 | 50285.79 |
| 1059 | | | | | | | 16 | 15 | 160493.42 | 78651.18 | 13167.33 | 57232.85 |
| 1060 | | | | | 2 on 1 | | 10 | 10 | 124329.74 | 92136.52 | 104403.2 | 44308.07 |
| 1061 | | | | | | 6 | 16 | 13 | 124109 | 85168.97 | 103306.98 | 44388.61 |
| 1062 | | | | 8x10 | | 10 | 16 | 11 | 93949.12 | 79405.61 | 80085.1 | 33675.22 |
| 1063 | | | | | | | 4 | 8.5 | 37782.02 | 13811.75 | 118276.41 | 18049.1 |
| 1064 | | | | | | 2 | 10 | 10 | 33038.33 | 13626.04 | 42436.64 | 18069.88 |
| 1065 | 3000 | 3 | 10 | | 4 on 1 | | 16 | 11.5 | 29018.7 | 14709.79 | 41862.11 | 18080.68 |
| 1066 | | | | | | | 10 | 9 | 26814.29 | 11862.46 | 31932.32 | 14018.82 |
| 1067 | | | | | | 6 | 16 | 10.5 | 23271.76 | 14920.46 | 31096.48 | 14028.11 |
| 1068 | | | | | | 10 | 16 | 9.5 | 18441.83 | 9967.74 | 23412.04 | 10645.91 |
| 1069 | | | | | | | 4 | 11 | 154748.66 | 105593.88 | 133045.38 | 57122.54 |
| 1070 | | | | | | 2 | 10 | 14 | 155224.67 | 124903.58 | 131424.61 | 57217.83 |
| 1071 | | | | | 2 on 1 | | 16 | 17 | 163080.86 | 67780.78 | 135318.12 | 57250.47 |
| 1072 | | | | | | | 10 | 12 | 120213.31 | 93985.5 | 103092.09 | 44373.71 |
| 1073 | | | | | | 6 | 16 | 15 | 120495.41 | 86121.3 | 102872.05 | 44411.34 |
| 1074 | | | | 10x12 | | 10 | 16 | 13 | 91397.47 | 79299.27 | 79311.73 | 33699.72 |
| 1075 | | | | | | | 4 | 10.5 | 25800.68 | 12755.03 | 42277.96 | 18073.37 |
| 1076 | | | | | | 2 | 10 | 12 | 23706.71 | 12778.79 | 41739.22 | 18082.5 |
| 1077 | | | | | 4 on 1 | | 16 | 13.5 | 39853.74 | 25599.22 | 72197.88 | 31678.28 |
| 1078 | | | | | | | 10 | 11 | 18915.35 | 10861.03 | 31656.98 | 14029.95 |
| 1079 | | | | | | 6 | 16 | 12.5 | 17481.57 | 10701.38 | 31620.55 | 14032.35 |
| 1080 | | | | | | 10 | 16 | 11.5 | 13608.7 | 8986.46 | 23779.46 | 10650.13 |

# APPENDIX IV – RURAL ARTERIAL ACCIDENT COST COMPILATION

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | | | | | | | 10 | 5 | 11707.41 | 10696.41 | 10413.68 | 4455.44 |
| **2** | | | | | | | 18 | 9 | 12045.49 | 11258.58 | 10592.63 | 4531.69 |
| **3** | | | | | 2 on 1 | 8 | 26 | 13 | 13695.31 | 10947.23 | 11810.28 | 5110.39 |
| **4** | | | | | | | 18 | 6 | 8045.97 | 7440.35 | 7253.2 | 3044 |
| **5** | | | | 4x6 | | 14 | 26 | 10 | 9193.55 | 8119.04 | 8116.15 | 3452.85 |
| **6** | | | | | | 20 | 26 | 7 | 5268.41 | 5063.52 | 4759.65 | 1990.94 |
| **7** | | | | | | | 10 | 4.5 | 3355.95 | 2389.38 | 4088.13 | 1605.56 |
| **8** | | | | | 4 on 1 | 8 | 18 | 6.5 | 3158.04 | 2247.45 | 2889.54 | 1620.3 |
| **9** | | | | | | 14 | 18 | 5 | 2285.51 | 1899.32 | 1855.42 | 1092.31 |
| **10** | | | | | | | 10 | 9 | 13014.46 | 11762.4 | 10929.31 | 4531.69 |
| **11** | | | | | | | 18 | 13 | 14665.42 | 13614.3 | 12338.25 | 5110.39 |
| **12** | | | | | 2 on 1 | 8 | 26 | 17 | 14194.46 | 10724.39 | 12113.89 | 5350.11 |
| **13** | | | | | | | 18 | 10 | 9810.65 | 9100.4 | 8364.09 | 3452.85 |
| **14** | 1000 | 0 | 0 | 8x10 | | 14 | 26 | 14 | 9937.85 | 8768.26 | 8494.22 | 3462.39 |
| **15** | | | | | | 20 | 26 | 11 | 6402.51 | 6102.99 | 5511.36 | 2246.57 |
| **16** | | | | | | | 10 | 8.5 | 4905.62 | 3311.98 | 4112.55 | 1629.06 |
| **17** | | | | | 4 on 1 | 8 | 18 | 10.5 | 4281.88 | 2592.54 | 3651.87 | 1632 |
| **18** | | | | | | 14 | 18 | 9 | 3170.38 | 2585.62 | 2365.49 | 1104.01 |
| **19** | | | | | | | 10 | 11 | 13504.2 | 12991.55 | 11737.96 | 5103.02 |
| **20** | | | | | | | 18 | 15 | 13598.84 | 13406.15 | 11711.76 | 5116.2 |
| **21** | | | | | 2 on 1 | 8 | 26 | 19 | 14207.66 | 11514.48 | 12044.8 | 5350.11 |
| **22** | | | | | | | 18 | 12 | 9175.16 | 8887.57 | 8058.4 | 3459.27 |
| **23** | | | | 10x12 | | 14 | 26 | 16 | 9601.3 | 8742.52 | 8279.12 | 3620.17 |
| **24** | | | | | | 20 | 26 | 13 | 5977.38 | 6068.15 | 5273.73 | 2246.73 |
| **25** | | | | | | | 10 | 10.5 | 2961.1 | 2162.61 | 3370.82 | 1632 |
| **26** | | | | | 4 on 1 | 8 | 18 | 12.5 | 2670.82 | 1902.41 | 2633.49 | 1632.96 |
| **27** | | | | | | 14 | 18 | 11 | 1933.3 | 1634.98 | 1740.51 | 1104.97 |
| | | | | | | | | | | | | |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | 10 | 5 | 10461.7 | 9397.7 | 8936.42 | 3990.24 |
| 29 | | | | | | | 18 | 9 | 10622.83 | 9578.4 | 8733.39 | 4030.93 |
| 30 | | | | | 2 on 1 | 8 | 26 | 13 | 12128.21 | 8826.43 | 9657.31 | 4539.14 |
| 31 | | | | | | | 18 | 6 | 6960.38 | 6211.01 | 6067.31 | 2650.62 |
| 32 | | | | 4x6 | | 14 | 26 | 10 | 7980.31 | 6678.1 | 6671.48 | 2997.62 |
| 33 | | | | | | 20 | 26 | 7 | 4411.45 | 4231.13 | 3840.76 | 1682.37 |
| 34 | | | | | | | 10 | 4.5 | 2463.72 | 1636.27 | 2909.59 | 1432.29 |
| 35 | | | | | 4 on 1 | 8 | 18 | 6.5 | 2164.01 | 1522.01 | 2065.89 | 1441.44 |
| 36 | | | | | | 14 | 18 | 5 | 1515.03 | 1231.61 | 1348.1 | 950.41 |
| 37 | | | | | | | 10 | 9 | 11206.02 | 9676.66 | 8891.6 | 4030.93 |
| 38 | | | | | | | 18 | 13 | 12566.27 | 11224.65 | 9846.35 | 4539.14 |
| 39 | | | | | 2 on 1 | 8 | 26 | 17 | 12637.56 | 8301.65 | 10004.46 | 4750.37 |
| 40 | | | | | | | 18 | 10 | 8255.07 | 7208.07 | 6726.43 | 2997.62 |
| 41 | 1000 | 0 | 3 | 8x10 | | 14 | 26 | 14 | 8277.42 | 7024.18 | 6646.95 | 3002.86 |
| 42 | | | | | | 20 | 26 | 11 | 5210.95 | 4971.59 | 4272.09 | 1894.43 |
| 43 | | | | | | | 10 | 8.5 | 3183.47 | 2002.21 | 2441.62 | 1446.28 |
| 44 | | | | | 4 on 1 | 8 | 18 | 10.5 | 2691.68 | 1663.21 | 2337.06 | 1448.16 |
| 45 | | | | | | 14 | 18 | 9 | 1910.46 | 1503.55 | 1523.07 | 956.94 |
| 46 | | | | | | | 10 | 11 | 12031.76 | 10851.45 | 9711.92 | 4534.11 |
| 47 | | | | | | | 18 | 15 | 12098.64 | 11324.83 | 9623.11 | 4542.38 |
| 48 | | | | | 2 on 1 | 8 | 26 | 19 | 12646.92 | 9559.47 | 9957.28 | 4750.37 |
| 49 | | | | | | | 18 | 12 | 7985.67 | 7282.8 | 6618.67 | 3000.58 |
| 50 | | | | 10x12 | | 14 | 26 | 16 | 8355.79 | 7311.32 | 6784.93 | 3139.69 |
| 51 | | | | | | 20 | 26 | 13 | 5058.07 | 4940.02 | 4201.59 | 1894.88 |
| 52 | | | | | | | 10 | 10.5 | 2135.63 | 1530.54 | 2197.53 | 1448.14 |
| 53 | | | | | 4 on 1 | 8 | 18 | 12.5 | 1924.3 | 1396.54 | 1998.57 | 1448.86 |
| 54 | | | | | | 14 | 18 | 11 | 1333.12 | 1139.07 | 1298.32 | 957.65 |
| 55 | | | | | | | 10 | 5 | 28644.31 | 25544.81 | 27165.45 | 10969.56 |
| 56 | | | 6 | 4x6 | 2on 1 | | 18 | 9 | 29066.21 | 26268.63 | 27433.55 | 11083.84 |
| 57 | | | | | | 8 | 26 | 13 | 33340.73 | 23530.35 | 30350.12 | 12466.57 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 | | | | | | | 18 | 6 | 18950.36 | 16744.16 | 18186.93 | 7248.23 |
| 59 | | | | | 2 on 1 | 14 | 26 | 10 | 21840.14 | 18167.02 | 20415.31 | 8181.11 |
| 60 | | | | 4x6 | | 20 | 26 | 7 | 12073.58 | 11552.58 | 11728.83 | 4603.07 |
| 61 | | | | | | | 10 | 4.5 | 5824.92 | 4049.18 | 10727.92 | 3936.52 |
| 62 | | | | | 4 on 1 | 8 | 18 | 6.5 | 5264.27 | 3850.03 | 5804.03 | 3964.22 |
| 63 | | | | | | 14 | 18 | 5 | 3617.71 | 3026.26 | 3626.17 | 2598.46 |
| 64 | | | | | | | 10 | 9 | 30165.66 | 26082.52 | 27547.49 | 11083.84 |
| 65 | | | | | | | 18 | 13 | 34229.7 | 30537.89 | 30670.75 | 12466.57 |
| 66 | | | | | 2 on 1 | 8 | 26 | 17 | 34782.64 | 21633.74 | 31532.44 | 13041.24 |
| 67 | | | | | | | 18 | 10 | 22383.91 | 19341.92 | 20508.14 | 8181.11 |
| 68 | | 0 | 6 | 8x10 | | 14 | 26 | 14 | 22469.26 | 19242.11 | 20626.64 | 8188.91 |
| 69 | | | | | | 20 | 26 | 11 | 14176.46 | 13430.7 | 13183.89 | 5180.8 |
| 70 | | | | | | | 10 | 8.5 | 7405.59 | 4787.56 | 9977.26 | 3973.77 |
| 71 | | | | | 4 on 1 | 8 | 18 | 10.5 | 6475.18 | 4238.47 | 6443.53 | 3977.9 |
| 72 | 1000 | | | | | 14 | 18 | 9 | 4514.37 | 3615.97 | 4104.41 | 2611.94 |
| 73 | | | | | | | 10 | 11 | 33152.87 | 29589.33 | 30545.35 | 12453.29 |
| 74 | | | | | | | 18 | 15 | 33292.8 | 30936.22 | 30323.06 | 12471.66 |
| 75 | | | | | 2 on 1 | 8 | 26 | 19 | 34805.96 | 25425.05 | 31463.99 | 13041.24 |
| 76 | | | | | | | 18 | 12 | 21839.59 | 19611.35 | 20403.71 | 8187.19 |
| 77 | | | | 10x12 | | 14 | 26 | 16 | 22853.78 | 19753.51 | 21104.83 | 8562.4 |
| 78 | | | | | | 20 | 26 | 13 | 13856.35 | 13435.84 | 13132.05 | 5180.65 |
| 79 | | | | | | | 10 | 10.5 | 5377.58 | 4028.98 | 10142.18 | 3977.9 |
| 80 | | | | | 4 on 1 | 8 | 18 | 12.5 | 4923.16 | 3743.85 | 5979.42 | 3978.44 |
| 81 | | | | | | 14 | 18 | 11 | 3355.27 | 3002.75 | 3837.03 | 2612.43 |
| 82 | | | | | | | 10 | 5 | 16800.89 | 15350.04 | 14944.31 | 6393.85 |
| 83 | | | | | | | 18 | 9 | 17285.48 | 16156.79 | 15201.11 | 6503.26 |
| 84 | | | | | 2 on 1 | 8 | 26 | 13 | 19653.65 | 15709.98 | 16948.52 | 7333.73 |
| 85 | | 3 | 0 | | | | 18 | 6 | 11546.48 | 10677.38 | 10408.81 | 4368.34 |
| 86 | | | | 4x6 | | 14 | 26 | 10 | 13193.34 | 11651.34 | 11647.2 | 4955.06 |
| 87 | | | | | | 20 | 26 | 7 | 7560.51 | 7266.48 | 6830.4 | 2857.12 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88 | 1000 | 3 | 0 | 4x6 | 4 on 1 | 8 | 10 | 4.5 | 4816.01 | 3428.91 | 5995.58 | 2304.08 |
| 89 | | | | | | | 18 | 6.5 | 4531.99 | 3225.24 | 4146.48 | 2325.24 |
| 90 | | | | | | 14 | 18 | 5 | 3279.86 | 2725.64 | 2662.64 | 1567.54 |
| 91 | | | | 8x10 | 2 on 1 | 8 | 10 | 9 | 18676.59 | 16879.8 | 15684.05 | 6503.26 |
| 92 | | | | | | | 18 | 13 | 21045.83 | 19537.4 | 17706.19 | 7333.73 |
| 93 | | | | | | | 26 | 17 | 20369.53 | 15390.19 | 17384.21 | 7677.75 |
| 94 | | | | | | 14 | 18 | 10 | 14078.91 | 13059.66 | 12003.01 | 4955.06 |
| 95 | | | | | | | 26 | 14 | 14261.45 | 12583.02 | 12189.75 | 4968.76 |
| 96 | | | | | | 20 | 26 | 11 | 9188.02 | 8758.18 | 7909.16 | 3223.97 |
| 97 | | | | | 4 on 1 | 8 | 10 | 8.5 | 7039.88 | 4752.9 | 5901.77 | 2337.81 |
| 98 | | | | | | | 18 | 10.5 | 6144.77 | 3720.46 | 5240.67 | 2342.02 |
| 99 | | | | | | 14 | 18 | 9 | 4549.7 | 3710.53 | 3394.63 | 1584.32 |
| 100 | | | | 10x12 | 2 on 1 | 8 | 10 | 11 | 19379.4 | 18643.72 | 16844.74 | 7323.16 |
| 101 | | | | | | | 18 | 15 | 19515.21 | 19238.69 | 16807.13 | 7342.08 |
| 102 | | | | | | | 26 | 19 | 20388.92 | 16524.03 | 17285.06 | 7677.75 |
| 103 | | | | | | 14 | 18 | 12 | 13166.94 | 12754.24 | 11564.32 | 4964.27 |
| 104 | | | | | | | 26 | 16 | 13778.48 | 12546.08 | 11881.07 | 5195.17 |
| 105 | | | | | | 20 | 26 | 13 | 8577.92 | 8708.19 | 7568.13 | 3224.19 |
| 106 | | | | | 4 on 1 | 8 | 10 | 10.5 | 4249.37 | 3103.48 | 4837.34 | 2342.02 |
| 107 | | | | | | | 18 | 12.5 | 3832.8 | 2730.09 | 3779.23 | 2343.4 |
| 108 | | | | | | 14 | 18 | 11 | 2774.4 | 2346.3 | 2497.74 | 1585.7 |
| 109 | | | 3 | 4x6 | 2 on 1 | 8 | 10 | 5 | 15013.21 | 13486.3 | 12824.33 | 5726.25 |
| 110 | | | | | | | 18 | 9 | 15244.45 | 13745.62 | 12532.98 | 5784.64 |
| 111 | | | | | | | 26 | 13 | 17404.76 | 12666.5 | 13858.86 | 6513.95 |
| 112 | | | | | | 14 | 18 | 6 | 9988.6 | 8913.2 | 8706.98 | 3803.81 |
| 113 | | | | | | | 26 | 10 | 11452.26 | 9583.51 | 9574 | 4301.78 |
| 114 | | | | | | 20 | 26 | 7 | 6330.71 | 6071.94 | 5511.74 | 2414.34 |
| 115 | | | | | 4 on 1 | 8 | 10 | 4.5 | 3535.6 | 2348.15 | 4175.44 | 2055.43 |
| 116 | | | | | | | 18 | 6.5 | 3105.5 | 2184.19 | 2964.69 | 2068.56 |
| 117 | | | | | | 14 | 18 | 5 | 2174.16 | 1767.44 | 1934.61 | 1363.91 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | | | | | | | 10 | 9 | 16081.36 | 13886.64 | 12760.02 | 5784.64 |
| 119 | | | | | | | 18 | 13 | 18033.41 | 16108.1 | 14130.14 | 6513.95 |
| 120 | | | | | 2 on 1 | 8 | 26 | 17 | 18135.72 | 11913.4 | 14357.04 | 6817.08 |
| 121 | | | | | | | 18 | 10 | 11846.56 | 10344.05 | 9652.86 | 4301.78 |
| 122 | | | | 8x10 | | 14 | 26 | 14 | 11878.64 | 10080.16 | 9538.8 | 4309.29 |
| 123 | | | | | | 20 | 26 | 11 | 7478.04 | 7134.55 | 6130.72 | 2718.62 |
| 124 | | | 3 | | | | 10 | 8.5 | 4568.49 | 2873.31 | 3503.88 | 2075.5 |
| 125 | | | | | 4 on 1 | 8 | 18 | 10.5 | 3862.73 | 2386.82 | 3353.84 | 2078.17 |
| 126 | | | | | | 14 | 18 | 9 | 2741.64 | 2157.69 | 2236.68 | 1373.27 |
| 127 | | | | | | | 10 | 11 | 17266.35 | 15572.53 | 13937.22 | 6506.74 |
| 128 | | | | | | | 18 | 15 | 17362.34 | 16251.87 | 13809.79 | 6518.61 |
| 129 | | | | | 2 on 1 | 8 | 26 | 19 | 18149.15 | 13718.46 | 14289.34 | 6817.08 |
| 130 | | | | | | | 18 | 12 | 11459.95 | 10451.28 | 9498.21 | 4306.02 |
| 131 | 1000 | 3 | | 10x12 | | 14 | 26 | 16 | 11991.1 | 10492.21 | 9736.82 | 4505.66 |
| 132 | | | | | | 20 | 26 | 13 | 7258.65 | 7089.25 | 6029.55 | 2719.27 |
| 133 | | | | | | | 10 | 10.5 | 3064.77 | 2196.43 | 3153.59 | 2078.17 |
| 134 | | | | | 4 on 1 | 8 | 18 | 12.5 | 2761.49 | 2004.13 | 3144.07 | 2079.21 |
| 135 | | | | | | 14 | 18 | 11 | 1913.11 | 1634.63 | 1863.17 | 1374.29 |
| 136 | | | | | | | 10 | 5 | 41711.89 | 37697.19 | 39368.92 | 15906.02 |
| 137 | | | | | | | 18 | 9 | 47846.11 | 33767.57 | 43554.39 | 17890.33 |
| 138 | | | | | 2 on 1 | 8 | 26 | 13 | 27194.99 | 24028.95 | 26099.41 | 10401.68 |
| 139 | | | | | | | 18 | 6 | 31342.02 | 26070.84 | 29297.29 | 11740.42 |
| 140 | | | 6 | 4x6 | | 14 | 26 | 10 | 17326.37 | 16578.71 | 16831.63 | 6605.7 |
| 141 | | | | | | 20 | 26 | 7 | 8359.14 | 5810.83 | 15395.26 | 5649.16 |
| 142 | | | | | | | 10 | 4.5 | 7554.56 | 5525.05 | 8329.16 | 5688.91 |
| 143 | | | | | 4 on 1 | 8 | 18 | 6.5 | 5191.65 | 4342.87 | 5203.78 | 3728.96 |
| 144 | | | | | | 14 | 18 | 5 | 43289.67 | 37430.11 | 39532.43 | 15906.06 |
| 145 | | | | | | | 10 | 9 | 49121.83 | 43823.84 | 44014.5 | 17890.33 |
| 146 | | | | | 2 on 1 | | 18 | 13 | 49915.34 | 31045.81 | 45251.09 | 18715.02 |
| 147 | | | | | | 8 | 26 | 17 | 32122.35 | 27756.9 | 29430.51 | 11740.42 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 148 | | | | | | | 18 | 10 | 32244.84 | 27613.66 | 29600.56 | 11751.61 |
| 149 | | | | 8x10 | 2 on 1 | 14 | 26 | 14 | 10627.5 | 6870.46 | 14318.01 | 5702.62 |
| 150 | | | | | | 20 | 26 | 11 | 9292.3 | 6082.48 | 9246.88 | 5708.54 |
| 151 | | | | | | | 10 | 8.5 | 20344.13 | 19273.93 | 18919.73 | 7434.78 |
| 152 | | | | | 4 on 1 | 8 | 18 | 10.5 | 6478.41 | 5189.15 | 5890.09 | 3748.31 |
| 153 | 1000 | 3 | 6 | | | 14 | 18 | 9 | 47576.51 | 42462.6 | 43834.55 | 17871.28 |
| 154 | | | | | | | 10 | 11 | 47777.33 | 44395.48 | 43515.55 | 17897.63 |
| 155 | | | | | | | 18 | 15 | 49948.8 | 36486.59 | 45152.86 | 18715.02 |
| 156 | | | | | 2 on 1 | 8 | 26 | 19 | 31341.21 | 28143.55 | 29280.65 | 11749.15 |
| 157 | | | | | | | 18 | 12 | 32796.64 | 28347.56 | 30286.79 | 12287.6 |
| 158 | | | | 10x12 | | 14 | 26 | 16 | 19884.75 | 19281.3 | 18845.35 | 7434.57 |
| 159 | | | | | | 20 | 26 | 13 | 7717.17 | 5781.84 | 14554.68 | 5708.54 |
| 160 | | | | | | | 10 | 10.5 | 7065.06 | 5372.67 | 8580.86 | 5709.32 |
| 161 | | | | | 4 on 1 | 8 | 18 | 12.5 | 4815.03 | 4309.14 | 5506.39 | 3749 |
| 162 | | | | | | 14 | 18 | 11 | 41106.43 | 36658.46 | 38984.17 | 15742.03 |
| 163 | | | | | | | 10 | 5 | 21566.29 | 18093.88 | 18348.32 | 8207.39 |
| 164 | | | | | | | 18 | 9 | 22188.31 | 17434.88 | 18473.78 | 8347.84 |
| 165 | | | | | 2 on 1 | 8 | 26 | 13 | 25228.19 | 20142.63 | 20659.66 | 70.66 |
| 166 | | | | | | | 18 | 6 | 14821.52 | 13705.26 | 12778.55 | 5607.37 |
| 167 | 2000 | 0 | 0 | 4x6 | | 14 | 26 | 10 | 16935.49 | 14956.12 | 14261.3 | 6360.51 |
| 168 | | | | | | 20 | 26 | 7 | 9704.97 | 8768.93 | 8475.15 | 3667.51 |
| 169 | | | | | | | 10 | 4.5 | 6182.02 | 3570.83 | 4894.4 | 2957.6 |
| 170 | | | | | | | 18 | 6.5 | 7368.69 | 5227.6 | 6807.5 | 89.76 |
| 171 | | | | | 4 on 1 | 8 | 26 | 8.5 | 5190.75 | 3482.97 | 5202.57 | 3000.91 |
| 172 | | | | | | | 18 | 5 | 4210.16 | 2831.61 | 3974.69 | 2012.15 |
| 173 | | | | | | 14 | 26 | 7 | 3761.44 | 2554.21 | 3530.31 | 2028.29 |
| 174 | | | | | | 20 | 26 | 5.5 | 2640.46 | 1792.43 | 2201.82 | 1313.6 |
| 175 | | | | | | | 10 | 9 | 23974 | 19515.96 | 19043.68 | 70.29 |
| 176 | | | | 8x10 | 2 on 1 | | 18 | 13 | 27015.25 | 21466.14 | 21568.45 | 9413.87 |
| 177 | | | | | | 8 | 26 | 17 | 26147.13 | 21308.99 | 21008.65 | 9855.47 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 178 | | | | | | | 18 | 10 | 18072.24 | 16633.41 | 14796.76 | 6360.51 |
| 179 | | | | | 2 on 1 | 14 | 26 | 14 | 18306.56 | 16023.36 | 14961.55 | 6378.09 |
| 180 | | | | | | 20 | 26 | 11 | 11794.1 | 10480.91 | 9768.98 | 4138.41 |
| 181 | | | | 8x10 | | | 10 | 8.5 | 9036.67 | 4765.82 | 6387.24 | 3000.91 |
| 182 | | | | | | 8 | 18 | 10.5 | 7887.67 | 5281.69 | 6636.5 | 3006.31 |
| 183 | | | | | 4 on 1 | | 26 | 12.5 | 6666.71 | 4241.95 | 6293.96 | 3008.08 |
| 184 | | | | | | | 18 | 9 | 5840.17 | 3855.82 | 4239.89 | 2033.7 |
| 185 | | | | | | 14 | 26 | 11 | 4910.81 | 3352.66 | 4292.32 | 2035.47 |
| 186 | | | | | | 20 | 26 | 9.5 | 3522.5 | 2324.78 | 2690.27 | 1320.78 |
| 187 | | | 0 | | | | 10 | 11 | 24876.16 | 21797.04 | 20476.98 | 9400.3 |
| 188 | | | | | | | 18 | 15 | 25050.49 | 20915.71 | 20361.43 | 9424.58 |
| 189 | | | | | 2 on 1 | 8 | 26 | 19 | 26172.01 | 21210.89 | 21001.75 | 9855.47 |
| 190 | | | | | | | 18 | 12 | 16901.6 | 16380.63 | 14197.61 | 6372.33 |
| 191 | | | | | | 14 | 26 | 16 | 16983.73 | 16024.41 | 14038.17 | 6377.25 |
| 192 | | | | | | 20 | 26 | 13 | 11010.96 | 10487.01 | 9280.68 | 4138.69 |
| 193 | 2000 | 0 | | 10x12 | | | 10 | 10.5 | 5454.65 | 3328.75 | 4976.1 | 3006.31 |
| 194 | | | | | | 8 | 18 | 12.5 | 4919.93 | 3597.27 | 5048.72 | 3008.08 |
| 195 | | | | | 4 on 1 | | 26 | 14.5 | 4391.66 | 3085.25 | 4653.46 | 3007.89 |
| 196 | | | | | | | 18 | 11 | 3561.33 | 2572.09 | 3288.37 | 47.47 |
| 197 | | | | | | 14 | 26 | 13 | 3154.04 | 2283.5 | 3166.48 | 2035.28 |
| 198 | | | | | | 20 | 26 | 11.5 | 2205.45 | 1601.38 | 2023.47 | 1320.58 |
| 199 | | | | | | | 10 | 5 | 19271.45 | 15477.19 | 16473 | 7350.4 |
| 200 | | | | | | | 18 | 9 | 19568.37 | 14469.12 | 16087.82 | 7425.4 |
| 201 | | | | | 2 on 1 | 8 | 26 | 13 | 22341.44 | 16271.25 | 17789.78 | 62.66 |
| 202 | | | | | | | 18 | 6 | 12821.76 | 11441.29 | 11176.62 | 4882.71 |
| 203 | | | | | | 14 | 26 | 10 | 14700.57 | 12301.76 | 12289.56 | 5521.93 |
| 204 | | | 3 | 4x6 | | 20 | 26 | 7 | 8126.35 | 7078.07 | 7075.09 | 3099.1 |
| 205 | | | | | | | 10 | 4.5 | 4538.43 | 2478.18 | 4128.38 | 2638.43 |
| 206 | | | | | 4 on 1 | | 18 | 6.5 | 5048.14 | 3535.29 | 5132.1 | 79.76 |
| 207 | | | | | | 8 | 26 | 8.5 | 3558.31 | 2385.22 | 3673.69 | 2664.19 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | | | | | | | 18 | 5 | 2790.84 | 1886.32 | 3129.3 | 1750.76 |
| 209 | | | | 4x6 | 4 on 1 | 14 | 26 | 7 | 2423.66 | 1539.56 | 2396.36 | 1759.59 |
| 210 | | | | | | 20 | 26 | 5.5 | 1627.65 | 1160.31 | 1426.12 | 1109.05 |
| 211 | | | | | | | 10 | 9 | 20642.66 | 15844.71 | 16379.26 | 62.43 |
| 212 | | | | | | | 18 | 13 | 23148.4 | 16352.34 | 18137.99 | 8361.57 |
| 213 | | | | | 2 on 1 | 8 | 26 | 17 | 23279.72 | 17202.61 | 18429.26 | 8750.68 |
| 214 | | | | | | | 18 | 10 | 15206.76 | 13246.75 | 12390.79 | 5521.93 |
| 215 | | | | | | 14 | 26 | 14 | 15247.89 | 12878.13 | 12244.37 | 5531.58 |
| 216 | | | | | | 20 | 26 | 11 | 9599.11 | 8202.42 | 7869.64 | 3489.73 |
| 217 | | | 3 | 8x10 | | | 10 | 8.5 | 5864.29 | 2825.91 | 4497.72 | 2664.19 |
| 218 | | | | | | 8 | 18 | 10.5 | 4958.35 | 3222.14 | 4373.01 | 2667.62 |
| 219 | | | | | 4 on 1 | | 26 | 12.5 | 4292.59 | 2693.6 | 4084.84 | 2668.95 |
| 220 | | | | | | | 18 | 9 | 3519.27 | 2202.95 | 2871.09 | 1762.78 |
| 221 | | | | | | 14 | 26 | 11 | 2957.04 | 1767.3 | 2666.13 | 1764.09 |
| 222 | 2000 | 0 | | | | 20 | 26 | 9.5 | 2022.61 | 1341.35 | 1596.69 | 1113.21 |
| 223 | | | | | | | 10 | 11 | 22163.76 | 18151.68 | 17890.37 | 8352.31 |
| 224 | | | | | | | 18 | 15 | 22286.98 | 16706.48 | 17726.79 | 8367.54 |
| 225 | | | | | 4 on 1 | 8 | 26 | 19 | 23296.96 | 17609.55 | 18342.22 | 8750.68 |
| 226 | | | | | | | 18 | 12 | 14710.44 | 13410.15 | 12192.28 | 5527.38 |
| 227 | | | | | | 14 | 26 | 16 | 14752.68 | 13062.09 | 12014.33 | 5530.85 |
| 228 | | | | | | 20 | 26 | 13 | 9317.49 | 8350.47 | 7739.77 | 3490.57 |
| 229 | | | | 10x12 | | | 10 | 10.5 | 3934.06 | 2355.79 | 4048.07 | 2667.62 |
| 230 | | | | | | 8 | 18 | 12.5 | 3544.76 | 2613.93 | 4035.85 | 2668.95 |
| 231 | | | | | 4 on 1 | | 26 | 14.5 | 3247.06 | 2301.72 | 3583.67 | 2668.73 |
| 232 | | | | | | | 18 | 11 | 2455.74 | 1797.43 | 2601.86 | 41.44 |
| 233 | | | | | | 14 | 26 | 13 | 2203.74 | 1549.23 | 2361.37 | 1763.9 |
| 234 | | | | | | 20 | 26 | 11.5 | 1465.3 | 1142.26 | 1440.11 | 1113.05 |
| 235 | | | 6 | 4x6 | 2 on 1 | | 10 | 5 | 52765.83 | 41869.54 | 46049.05 | 20207.09 |
| 236 | | | | | | | 18 | 9 | 53543.02 | 38924.33 | 45436.45 | 20417.6 |
| 237 | | | | | | 8 | 26 | 13 | 61417.14 | 43559.59 | 50809.01 | 173.09 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 238 | | | | | | | 18 | 6 | 34908.56 | 30844.4 | 31136.25 | 13352 |
| 239 | | | | | 2 on 1 | 14 | 26 | 10 | 40231.84 | 33465.55 | 34984.44 | 15070.46 |
| 240 | | | | 4x6 | | 20 | 26 | 7 | 22240.81 | 19330.8 | 20263.05 | 8479.34 |
| 241 | | | | | | | 10 | 4.5 | 10730.12 | 6311.65 | 11672.43 | 7251.48 |
| 242 | | | | | | | 18 | 6.5 | 12278.58 | 8977.5 | 15089.98 | 220.59 |
| 243 | | | | | 4 on 1 | 8 | 26 | 8.5 | 8869.81 | 6338.79 | 10690.41 | 7320.11 |
| 244 | | | | | | | 18 | 5 | 6664.21 | 4772.67 | 8508.35 | 4786.64 |
| 245 | | | | | | 14 | 26 | 7 | 5997.91 | 4022.69 | 6713.5 | 4804.16 |
| 246 | | | | | | 20 | 26 | 5.5 | 3953.71 | 3050.19 | 4099.15 | 3036.67 |
| 247 | | | | | | | 10 | 9 | 55568.31 | 42467.01 | 45634.87 | 172.63 |
| 248 | | | | | | | 18 | 13 | 63054.71 | 43490.36 | 51063.25 | 22964.73 |
| 249 | | | | | 2 on 1 | 8 | 26 | 17 | 64073.29 | 45844.43 | 52796.35 | 24023.33 |
| 250 | | | | | | | 18 | 10 | 41233.51 | 35355.04 | 34975.5 | 15070.46 |
| 251 | | | | | | 14 | 26 | 14 | 41390.74 | 35029.9 | 34583.24 | 15084.83 |
| 252 | | | | | | 20 | 26 | 11 | 26114.53 | 22158.67 | 22583.41 | 9543.57 |
| 253 | 2000 | 0 | 6 | 8x10 | | | 10 | 8.5 | 13641.87 | 7089.63 | 12867.76 | 7320.11 |
| 254 | | | | | | 8 | 18 | 10.5 | 11927.96 | 8237.51 | 12868.82 | 7327.71 |
| 255 | | | | | 4 on 1 | | 26 | 12.5 | 10578.64 | 7255.25 | 11633.92 | 7328.71 |
| 256 | | | | | | | 18 | 9 | 8315.94 | 5521.02 | 8212.05 | 4811.48 |
| 257 | | | | | | 14 | 26 | 11 | 7236.08 | 4613.07 | 7465.36 | 4812.36 |
| 258 | | | | | | 20 | 26 | 9.5 | 4851.29 | 3574 | 4659.98 | 3044.89 |
| 259 | | | | | | | 10 | 11 | 61071.07 | 49035.52 | 51054.45 | 22940.28 |
| 260 | | | | | | | 18 | 15 | 61328.85 | 44818.15 | 50485.08 | 22974.1 |
| 261 | | | | | 2 on 1 | 8 | 26 | 19 | 64116.23 | 46835.62 | 52049.28 | 24023.33 |
| 262 | | | | | | | 18 | 12 | 40230.81 | 36125.95 | 34695 | 15081.67 |
| 263 | | | | | | 14 | 26 | 16 | 40336.5 | 35278.71 | 34167.95 | 15083.77 |
| 264 | | | | | | 20 | 26 | 13 | 25524.85 | 22588.56 | 22376.69 | 9543.31 |
| 265 | | | | 10x12 | | | 10 | 10.5 | 9906.07 | 6263.68 | 12762.56 | 7327.71 |
| 266 | | | | | 4 on 1 | 8 | 18 | 12.5 | 9068.98 | 7013.85 | 12773.81 | 7328.71 |
| 267 | | | | | | | 26 | 14.5 | 8448.77 | 6320.05 | 10977.36 | 7328.47 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 268 | | | | | | | 18 | 11 | 6180.77 | 4812.71 | 8114.03 | 113.83 |
| 269 | | 0 | 6 | 10x12 | 4 on 1 | 14 | 26 | 13 | 5693.08 | 4180.75 | 7005.29 | 4812.13 |
| 270 | | | | | | 20 | 26 | 11.5 | 3738.19 | 3124.84 | 4383.83 | 3044.66 |
| 271 | | | | | | | 10 | 5 | 27457.26 | 23036.34 | 23360.3 | 10449.3 |
| 272 | | | | | | | 18 | 9 | 28249.21 | 22197.33 | 23520.02 | 10628.11 |
| 273 | | | | | 2 on 1 | 8 | 26 | 13 | 32119.45 | 25644.73 | 26302.98 | 89.96 |
| 274 | | | | | | | 18 | 6 | 18870.12 | 17448.95 | 16269.1 | 7139.06 |
| 275 | | | | | | 14 | 26 | 10 | 21561.53 | 19041.49 | 18156.87 | 8097.93 |
| 276 | | | | 4x6 | | 20 | 26 | 7 | 12355.95 | 11164.23 | 10790.2 | 4669.32 |
| 277 | | | | | | | 10 | 4.5 | 7870.68 | 4546.22 | 6231.34 | 3765.49 |
| 278 | | | | | | | 18 | 6.5 | 9381.5 | 6655.55 | 8667.02 | 114.27 |
| 279 | | | | | 4 on 1 | 8 | 26 | 8.5 | 6608.64 | 4434.36 | 6623.69 | 3820.62 |
| 280 | | | | | | | 18 | 5 | 5360.19 | 3605.08 | 5060.41 | 2561.78 |
| 281 | | | | | | 14 | 26 | 7 | 4788.9 | 3251.91 | 4494.64 | 2582.34 |
| 282 | | | | | | 20 | 26 | 5.5 | 3361.72 | 2282.04 | 2803.26 | 1672.41 |
| 283 | 2000 | 3 | 0 | | | | 10 | 9 | 30522.67 | 24846.88 | 24245.6 | 89.48 |
| 284 | | | | | | | 18 | 13 | 34394.65 | 27329.76 | 27460.06 | 11985.33 |
| 285 | | | | | 2 on 1 | 8 | 26 | 17 | 33289.39 | 27129.69 | 26747.3 | 12547.55 |
| 286 | | | | | | | 18 | 10 | 23008.8 | 21176.95 | 18838.6 | 8097.93 |
| 287 | | | | | | 14 | 26 | 14 | 23307.12 | 20400.25 | 19048.4 | 8120.31 |
| 288 | | | | | | 20 | 26 | 11 | 15015.75 | 13343.84 | 12437.44 | 5268.85 |
| 289 | | | | 8x10 | | | 10 | 8.5 | 11505.09 | 6067.64 | 8131.96 | 3820.62 |
| 290 | | | | | | 8 | 18 | 10.5 | 10042.25 | 6724.42 | 8449.31 | 3827.51 |
| 291 | | | | | 4 on 1 | | 26 | 12.5 | 8487.77 | 5400.66 | 8013.19 | 3829.76 |
| 292 | | | | | | | 18 | 9 | 7435.45 | 4909.07 | 5398.04 | 2589.22 |
| 293 | | | | | | 14 | 26 | 11 | 6252.24 | 4268.46 | 5464.8 | 2591.47 |
| 294 | | | | | | 20 | 26 | 9.5 | 4484.69 | 2959.81 | 3425.14 | 1681.55 |
| 295 | | | | | | | 10 | 11 | 31671.26 | 27751.05 | 26070.41 | 11968.05 |
| 296 | | | | 10x12 | 2 on 1 | | 18 | 15 | 31893.2 | 26628.99 | 25923.3 | 11998.96 |
| 297 | | | | | | 8 | 26 | 19 | 33321.07 | 27004.79 | 26738.53 | 12547.55 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 298 | | | | | | | 18 | 12 | 6263.84 | 4579.89 | 6427.82 | 3829.76 |
| 299 | | | | | 2 on 1 | 14 | 26 | 16 | 21518.39 | 20855.11 | 18075.78 | 8112.98 |
| 300 | | | | | | 20 | 26 | 13 | 21622.95 | 20401.59 | 17872.8 | 8119.25 |
| 301 | | | 0 | 10x12 | | | 10 | 10.5 | 14018.67 | 13351.61 | 11815.76 | 5269.21 |
| 302 | | | | | | 8 | 18 | 12.5 | 6944.63 | 4238.03 | 6335.36 | 3827.51 |
| 303 | | | | | 4 on 1 | | 26 | 14.5 | 5591.28 | 3928 | 5924.57 | 3829.51 |
| 304 | | | | | | | 18 | 11 | 4534.14 | 3274.67 | 4186.61 | 60.74 |
| 305 | | | | | | 14 | 26 | 13 | 4015.59 | 2907.25 | 4031.43 | 2591.23 |
| 306 | | | | | | 20 | 26 | 11.5 | 2807.88 | 2038.8 | 2576.2 | 1681.31 |
| 307 | | | | | | | 10 | 5 | 24535.58 | 19704.9 | 20972.71 | 9358.21 |
| 308 | | | | | | | 18 | 9 | 24913.61 | 18421.46 | 20482.32 | 9453.69 |
| 309 | | | | | 2 on 1 | 8 | 26 | 13 | 28444.15 | 20715.86 | 22649.18 | 79.78 |
| 310 | | | | | | | 18 | 6 | 16324.11 | 14566.55 | 14229.6 | 6216.46 |
| 311 | | | | | | 14 | 26 | 10 | 18716.13 | 15662.08 | 15646.54 | 7030.29 |
| 312 | | | | 4x6 | | 20 | 26 | 7 | 10346.12 | 9011.5 | 9007.7 | 3945.64 |
| 313 | | | | | | | 10 | 4.5 | 5778.13 | 3155.11 | 3256.08 | 3359.13 |
| 314 | | | | | | | 18 | 6.5 | 6427.08 | 4500.97 | 6533.97 | 101.55 |
| 315 | 2000 | 3 | 3 | | 4 on 1 | 8 | 26 | 8.5 | 4530.29 | 3036.76 | 4677.18 | 3391.93 |
| 316 | | | | | | | 18 | 5 | 3553.18 | 2401.59 | 3984.09 | 2229 |
| 317 | | | | | | 14 | 26 | 7 | 3085.7 | 1960.1 | 3050.94 | 2240.23 |
| 318 | | | | | | 20 | 26 | 5.5 | 2072.25 | 1477.25 | 1815.67 | 1411.99 |
| 319 | | | | | | | 10 | 9 | 26281.35 | 20172.8 | 20853.37 | 79.48 |
| 320 | | | | | | | 18 | 13 | 29471.54 | 20819.1 | 23092.5 | 10645.59 |
| 321 | | | | | 2 on 1 | 8 | 26 | 17 | 29638.73 | 21901.62 | 23463.34 | 11140.99 |
| 322 | | | | | | | 18 | 10 | 19360.52 | 16865.2 | 15775.42 | 7030.29 |
| 323 | | | | | | 14 | 26 | 14 | 19412.95 | 16395.88 | 15589.01 | 7042.57 |
| 324 | | | | | | 20 | 26 | 11 | 12221.17 | 10442.97 | 10019.28 | 4442.98 |
| 325 | | | | 8x10 | | | 10 | 8.5 | 7466.16 | 3597.83 | 5726.3 | 3391.93 |
| 326 | | | | | 4 on 1 | 8 | 18 | 10.5 | 6312.76 | 4102.29 | 5567.57 | 3396.3 |
| 327 | | | | | | | 26 | 12.5 | 5465.14 | 3429.38 | 5200.64 | 3397.99 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 328 | | | | | | | 18 | 9 | 4480.59 | 2804.7 | 3655.35 | 2244.3 |
| 329 | | | | 8x10 | 4 on 1 | 14 | 26 | 11 | 3764.78 | 2250.05 | 3394.4 | 2245.96 |
| 330 | | | | | | 20 | 26 | 9.5 | 2575.11 | 1707.75 | 2032.84 | 1417.3 |
| 331 | | | | | | | 10 | 11 | 28217.94 | 23109.93 | 22777.24 | 10633.8 |
| 332 | | | | | | | 18 | 15 | 28374.82 | 21269.97 | 22568.98 | 10653.19 |
| 333 | | | | | 2 on 1 | 8 | 26 | 19 | 29660.68 | 22419.72 | 23352.52 | 11140.99 |
| 334 | | | | | | | 18 | 12 | 18728.69 | 17073.23 | 15522.69 | 7037.22 |
| 335 | | | | | | 14 | 26 | 16 | 18782.48 | 16630.09 | 15296.13 | 7041.64 |
| 336 | | | | | | 20 | 26 | 13 | 11862.63 | 10631.46 | 9853.94 | 4444.04 |
| 337 | | | 3 | 10x12 | | | 10 | 10.5 | 5008.68 | 2999.29 | 5153.83 | 3396.3 |
| 338 | | | | | | 8 | 18 | 12.5 | 4513.04 | 3327.94 | 5138.27 | 3397.99 |
| 339 | | | | | 4 on 1 | | 26 | 14.5 | 4134.02 | 2930.45 | 4562.58 | 3397.71 |
| 340 | | | | | | | 18 | 11 | 3126.54 | 2288.41 | 3312.57 | 52.76 |
| 341 | | | | | | 14 | 26 | 13 | 2805.7 | 1972.42 | 3006.4 | 2245.72 |
| 342 | 2000 | 3 | | | | 20 | 26 | 11.5 | 1865.56 | 1454.27 | 1833.49 | 1417.08 |
| 343 | | | | | | | 10 | 5 | 67179.17 | 53306.49 | 58627.66 | 25726.79 |
| 344 | | | | | | | 18 | 9 | 68168.66 | 49556.77 | 57847.72 | 25994.8 |
| 345 | | | | | 2 on 1 | 8 | 26 | 13 | 78193.65 | 55458.19 | 64687.84 | 220.37 |
| 346 | | | | | | | 18 | 6 | 44444.07 | 39269.76 | 39641.33 | 16999.19 |
| 347 | | | | | | 14 | 26 | 10 | 51221.44 | 42606.9 | 44540.68 | 19187.05 |
| 348 | | | 6 | 4x6 | | 20 | 26 | 7 | 28316.04 | 24611.14 | 25798.04 | 10795.53 |
| 349 | | | | | | | 10 | 4.5 | 13661.12 | 8035.73 | 14860.83 | 9232.28 |
| 350 | | | | | | | 18 | 6.5 | 15632.56 | 11429.77 | 19211.91 | 280.85 |
| 351 | | | | | 4 on 1 | 8 | 26 | 8.5 | 11292.66 | 8070.28 | 13610.56 | 9319.65 |
| 352 | | | | | | | 18 | 5 | 8484.58 | 6076.36 | 10832.47 | 6094.14 |
| 353 | | | | | | 14 | 26 | 7 | 7636.28 | 5121.51 | 8547.34 | 6116.45 |
| 354 | | | | | | 20 | 26 | 5.5 | 5033.7 | 3883.38 | 5218.86 | 3866.15 |
| 355 | | | | | | | 10 | 9 | 70747.17 | 54067.16 | 58100.34 | 219.76 |
| 356 | | | | 8x10 | 2 on 1 | | 18 | 13 | 80278.53 | 55370.05 | 65011.52 | 29237.7 |
| 357 | | | | | | 8 | 26 | 17 | 81575.34 | 58367.15 | 67218.02 | 30585.46 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 358 | | | | | | | 18 | 10 | 52496.72 | 45012.51 | 44529.29 | 19187.05 |
| 359 | | | | | 2 on 1 | 14 | 26 | 14 | 52696.91 | 44598.56 | 44029.89 | 19205.35 |
| 360 | | | | | | 20 | 26 | 11 | 33247.89 | 28211.46 | 28752.22 | 12150.46 |
| 361 | | | | 8x10 | | | 10 | 8.5 | 17368.24 | 9026.21 | 16382.68 | 9319.65 |
| 362 | | | | | | 8 | 18 | 10.5 | 15186.17 | 10487.65 | 16384.02 | 9329.33 |
| 363 | | | | | 4 on 1 | | 26 | 12.5 | 13468.27 | 9237.07 | 14811.81 | 9330.6 |
| 364 | | | | | | | 18 | 9 | 10587.49 | 7029.12 | 10455.23 | 6125.76 |
| 365 | | | | | | 14 | 26 | 11 | 9212.66 | 5873.16 | 9504.58 | 6126.89 |
| 366 | 2000 | 3 | 6 | | | 20 | 26 | 9.5 | 6176.45 | 4550.27 | 5932.88 | 3876.62 |
| 367 | | | | | | | 10 | 11 | 77753.05 | 62429.9 | 65000.32 | 29206.57 |
| 368 | | | | | | | 18 | 15 | 78081.24 | 57060.54 | 64275.42 | 29249.63 |
| 369 | | | | | 2 on 1 | 8 | 26 | 19 | 81630.02 | 59629.09 | 66266.89 | 30585.46 |
| 370 | | | | | | | 18 | 12 | 51220.13 | 45993.99 | 44172.17 | 19201.32 |
| 371 | | | | | | 14 | 26 | 16 | 51354.69 | 44915.34 | 43501.15 | 19204 |
| 372 | | | | | | 20 | 26 | 13 | 32497.13 | 28758.77 | 28489.04 | 12150.13 |
| 373 | | | | 10x12 | | | 10 | 10.5 | 12611.98 | 7974.65 | 16248.74 | 9329.33 |
| 374 | | | | | | 8 | 18 | 12.5 | 11546.24 | 8929.72 | 16263.06 | 9330.6 |
| 375 | | | | | 4 on 1 | | 26 | 14.5 | 10756.61 | 8046.42 | 13975.9 | 9330.29 |
| 376 | | | | | | | 18 | 11 | 7869.08 | 6127.33 | 10330.44 | 144.93 |
| 377 | | | | | | 14 | 26 | 13 | 7248.18 | 5322.75 | 8918.83 | 6126.6 |
| 378 | | | | | | 20 | 26 | 11.5 | 4759.31 | 3978.41 | 5581.3 | 3876.33 |
| 379 | | | | | | | 10 | 5 | 31835.95 | 26710.01 | 28317.91 | 12115.67 |
| 380 | | | | | | | 18 | 9 | 32754.18 | 25737.2 | 28804.49 | 12323.01 |
| 381 | | | | | 2 on 1 | 8 | 26 | 13 | 37241.62 | 29734.36 | 32115.68 | 13896.66 |
| 382 | | | | | | | 18 | 6 | 21879.39 | 20231.58 | 19723.3 | 8277.54 |
| 383 | | | | | | 14 | 26 | 10 | 25000.01 | 22078.09 | 22070.23 | 9389.33 |
| 384 | 4000 | 0 | 0 | 4x6 | | 20 | 26 | 7 | 14326.39 | 12944.62 | 12942.9 | 5413.95 |
| 385 | | | | | | | 10 | 4.5 | 9125.84 | 5271.22 | 8712.4 | 4365.98 |
| 386 | | | | | 4 on 1 | | 18 | 6.5 | 10877.59 | 7716.93 | 12099.18 | 5576.89 |
| 387 | | | | | | 8 | 26 | 8.5 | 7662.54 | 5141.52 | 8662.3 | 4429.91 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 388 | | | | | | | 18 | 5 | 6214.99 | 4179.99 | 6724.08 | 2970.32 |
| 389 | | | | 4x6 | 4 on 1 | 14 | 26 | 7 | 5552.6 | 3770.5 | 5793.44 | 2994.15 |
| 390 | | | | | | 20 | 26 | 5.5 | 3897.82 | 2645.96 | 3572.16 | 1939.12 |
| 391 | | | | | | | 10 | 9 | 35390.2 | 28809.27 | 29719.65 | 103.76 |
| 392 | | | | | | | 18 | 13 | 39879.66 | 31688.11 | 33551.39 | 13896.66 |
| 393 | | | | | 2 on 1 | 8 | 26 | 17 | 38598.14 | 31456.13 | 32941.27 | 14548.55 |
| 394 | | | | | | | 18 | 10 | 26678.07 | 24554.09 | 22744.46 | 9389.33 |
| 395 | | | | | | 14 | 26 | 14 | 27023.96 | 23653.53 | 23098.31 | 9415.28 |
| 396 | | | | | | 20 | 26 | 11 | 17410.34 | 15471.82 | 14987.03 | 6109.09 |
| 397 | | | 0 | 8x10 | | | 10 | 8.5 | 13339.84 | 7035.26 | 11183.25 | 4429.91 |
| 398 | | | | | | 8 | 18 | 10.5 | 11643.71 | 7796.78 | 11617.24 | 4437.89 |
| 399 | | | | | 4 on 1 | | 26 | 12.5 | 9841.34 | 6261.92 | 10339.19 | 4440.5 |
| 400 | | | | | | | 18 | 9 | 8621.2 | 5691.93 | 7311.19 | 3002.13 |
| 401 | | | | | | 14 | 26 | 11 | 7249.3 | 4949.17 | 7037.39 | 3004.74 |
| 402 | 4000 | 0 | | | | 20 | 26 | 9.5 | 5199.88 | 3431.81 | 4351.05 | 1949.72 |
| 403 | | | | | | | 10 | 11 | 36721.95 | 32176.58 | 31919.02 | 13876.63 |
| 404 | | | | | | | 18 | 15 | 36979.29 | 30875.58 | 31847.77 | 13912.47 |
| 405 | | | | | 2 on 1 | 8 | 26 | 19 | 38634.88 | 31311.31 | 32753.7 | 14548.55 |
| 406 | | | | | | | 18 | 12 | 24949.98 | 24180.93 | 21913.18 | 9406.78 |
| 407 | | | | | | 14 | 26 | 16 | 25071.22 | 23655.08 | 21757 | 9414.04 |
| 408 | | | | | | 20 | 26 | 13 | 16254.27 | 15480.82 | 14340.86 | 6109.5 |
| 409 | | | | 10x12 | | | 10 | 10.5 | 8052.11 | 4913.88 | 9166.25 | 4437.89 |
| 410 | | | | | | 8 | 18 | 12.5 | 7262.75 | 5549.05 | 9316.52 | 4440.5 |
| 411 | | | | | 4 on 1 | | 26 | 14.5 | 6482.93 | 4554.41 | 7948.17 | 4440.21 |
| 412 | | | | | | | 18 | 11 | 5257.21 | 3796.89 | 5966.33 | 3004.74 |
| 413 | | | | | | 14 | 26 | 13 | 4655.97 | 3370.88 | 5370.93 | 3004.46 |
| 414 | | | | | | 20 | 26 | 11.5 | 3255.66 | 2363.94 | 3381.96 | 1949.43 |
| 415 | | | | | | | 10 | 5 | 28448.33 | 22847.29 | 25827.56 | 10850.58 |
| 416 | | | 3 | 4x6 | 2 on 1 | | 18 | 9 | 28886.65 | 21359.18 | 25637.29 | 10961.3 |
| 417 | | | | | | 8 | 26 | 13 | 32980.22 | 24019.47 | 28579.65 | 12343.27 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 418 | 4000 | 0 | 3 | 4x6 | 2 on 1 | 14 | 18 | 6 | 18927.36 | 16889.52 | 17310.34 | 7207.82 |
| 419 | | | | | | | 26 | 10 | 21700.84 | 18159.75 | 19447.03 | 8151.43 |
| 420 | | | | | | 20 | 26 | 7 | 11996.04 | 10448.58 | 10938.75 | 4574.87 |
| 421 | | | | | 4 on 1 | 8 | 10 | 4.5 | 6699.59 | 3658.27 | 7891.79 | 3894.82 |
| 422 | | | | | | | 18 | 6.5 | 7452.02 | 5218.76 | 10055.87 | 4961.26 |
| 423 | | | | | | | 26 | 8.5 | 5252.74 | 3521.04 | 6718.19 | 3932.85 |
| 424 | | | | | | 14 | 18 | 5 | 4119.81 | 2784.57 | 5656.19 | 2584.46 |
| 425 | | | | | | | 26 | 7 | 3577.79 | 2272.69 | 4317.59 | 2597.49 |
| 426 | | | | | | 20 | 26 | 5.5 | 2402.71 | 1712.84 | 2509.09 | 1637.17 |
| 427 | | | | 8x10 | 2 on 1 | 8 | 10 | 9 | 30472.51 | 23389.81 | 26080.6 | 92.16 |
| 428 | | | | | | | 18 | 13 | 34171.45 | 24139.17 | 28962.78 | 12343.27 |
| 429 | | | | | | | 26 | 17 | 34365.3 | 25394.34 | 29580.4 | 12917.67 |
| 430 | | | | | | 14 | 18 | 10 | 22448 | 19554.74 | 19470.19 | 8151.43 |
| 431 | | | | | | | 26 | 14 | 22508.79 | 19010.57 | 19476.87 | 8165.67 |
| 432 | | | | | | 20 | 26 | 11 | 14170.12 | 12108.34 | 12290.64 | 5151.51 |
| 433 | | | | | 4 on 1 | 8 | 10 | 8.5 | 8656.81 | 4171.58 | 8841.58 | 3932.85 |
| 434 | | | | | | | 18 | 10.5 | 7319.48 | 4756.5 | 8733.41 | 3937.92 |
| 435 | | | | | | | 26 | 12.5 | 6336.68 | 3976.27 | 7415.23 | 3939.88 |
| 436 | | | | | | 14 | 18 | 9 | 5195.12 | 3251.97 | 5496.54 | 2602.2 |
| 437 | | | | | | | 26 | 11 | 4365.16 | 2608.87 | 4833.75 | 2604.13 |
| 438 | | | | | | 20 | 26 | 9.5 | 2985.76 | 1980.09 | 2845.5 | 1643.32 |
| 439 | | | | 10x12 | 2 on 1 | 8 | 10 | 11 | 32717.93 | 26795.34 | 28478.23 | 12329.6 |
| 440 | | | | | | | 18 | 15 | 32899.82 | 24661.95 | 28400.33 | 12352.09 |
| 441 | | | | | | | 26 | 19 | 34390.75 | 25995.06 | 29522.48 | 12917.67 |
| 442 | | | | | | 14 | 18 | 12 | 21715.41 | 19795.94 | 19162.29 | 8159.47 |
| 443 | | | | | | | 26 | 16 | 21777.77 | 19282.14 | 19216.15 | 8164.59 |
| 444 | | | | | | 20 | 26 | 13 | 13754.39 | 12326.89 | 12174.81 | 5152.74 |
| 445 | | | | | 4 on 1 | 8 | 10 | 10.5 | 5807.42 | 3477.59 | 8278.01 | 3937.92 |
| 446 | | | | | | | 18 | 12.5 | 5232.74 | 3858.66 | 8303.42 | 3939.88 |
| 447 | | | | | | | 26 | 14.5 | 4793.28 | 3397.77 | 6701.57 | 3939.55 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 448 | | | | | | | 18 | 11 | 3625.14 | 2653.35 | 5261.01 | 2604.13 |
| 449 | | | 3 | 10x12 | 4 on 1 | 14 | 26 | 13 | 3253.13 | 2286.96 | 4384.95 | 2603.86 |
| 450 | | | | | | 20 | 26 | 11.5 | 2163.07 | 1686.19 | 2651.68 | 1643.07 |
| 451 | | | | | | | 10 | 5 | 77892.41 | 61807.41 | 73870.95 | 29829.51 |
| 452 | | | | | | | 18 | 9 | 79039.7 | 57459.72 | 74600 | 30140.26 |
| 453 | | | | | 2 on 1 | 8 | 26 | 13 | 90663.39 | 64302.25 | 82531.03 | 33900.31 |
| 454 | | | | | | | 18 | 6 | 51531.68 | 45532.21 | 49455.64 | 19710.1 |
| 455 | | | | | | 14 | 26 | 10 | 59389.86 | 49401.54 | 55515.32 | 22246.86 |
| 456 | | | | 4x6 | | 20 | 26 | 7 | 32831.67 | 28535.94 | 31894.15 | 12517.12 |
| 457 | | | | | | | 10 | 4.5 | 15839.7 | 9317.21 | 24309.02 | 10704.57 |
| 458 | | | | | | | 18 | 6.5 | 18125.53 | 13252.5 | 32266.37 | 13644.21 |
| 459 | | | | | 4 on 1 | 8 | 26 | 8.5 | 13093.54 | 9357.27 | 20772.04 | 10805.88 |
| 460 | | | | | | | 18 | 5 | 9837.64 | 7045.37 | 16637.35 | 7065.99 |
| 461 | | | | | | 14 | 26 | 7 | 8854.06 | 5938.25 | 12788.45 | 7091.86 |
| 462 | 4000 | 0 | 6 | | | 20 | 26 | 5.5 | 5836.43 | 4502.67 | 7653.44 | 4482.7 |
| 463 | | | | | | | 10 | 9 | 82029.41 | 62689.39 | 74909.84 | 254.84 |
| 464 | | | | | | | 18 | 13 | 93080.76 | 64200.05 | 83402.91 | 33900.31 |
| 465 | | | | | 2 on 1 | 8 | 26 | 17 | 94584.38 | 67675.12 | 85746.11 | 35463.01 |
| 466 | | | | | | | 18 | 10 | 60868.52 | 52190.77 | 55767.75 | 22246.86 |
| 467 | | | | | | 14 | 26 | 14 | 61100.62 | 51710.81 | 56089.98 | 22268.08 |
| 468 | | | | | | 20 | 26 | 11 | 38550.02 | 32710.42 | 35850.92 | 14088.13 |
| 469 | | | | 8x10 | | | 10 | 8.5 | 20138 | 10465.65 | 27131.13 | 10805.88 |
| 470 | | | | | | 8 | 18 | 10.5 | 17607.95 | 12160.14 | 27591.22 | 10817.1 |
| 471 | | | | | 4 on 1 | | 26 | 12.5 | 15616.1 | 10710.13 | 22381.65 | 10818.57 |
| 472 | | | | | | | 18 | 9 | 12275.91 | 8150.07 | 17247.08 | 7102.66 |
| 473 | | | | | | 14 | 26 | 11 | 10681.83 | 6809.77 | 14199.75 | 7103.96 |
| 474 | | | | | | 20 | 26 | 9.5 | 7161.43 | 5275.91 | 8677.19 | 4494.83 |
| 475 | | | | | | | 10 | 11 | 90152.54 | 72385.77 | 83061.91 | 33864.22 |
| 476 | | | | 10x12 | 2 on 1 | | 18 | 15 | 90533.06 | 66160.13 | 82457.44 | 33914.15 |
| 477 | | | | | | 8 | 26 | 19 | 94647.77 | 69138.3 | 85559.98 | 35463.01 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 478 | | | | | | | 18 | 12 | 59388.34 | 53328.78 | 55483.79 | 22263.41 |
| 479 | | | | | 2 on 1 | 14 | 26 | 16 | 59544.36 | 52078.1 | 55700.54 | 22266.52 |
| 480 | | | | | | 20 | 26 | 13 | 37679.54 | 33345.01 | 35709.97 | 14087.74 |
| 481 | | 0 | 6 | 10x12 | | | 10 | 10.5 | 14623.24 | 9246.38 | 27579.61 | 10817.1 |
| 482 | | | | | | 8 | 18 | 12.5 | 13387.55 | 10353.77 | 27918.76 | 10818.57 |
| 483 | | | | | 4 on 1 | | 26 | 14.5 | 12472 | 9329.6 | 21460.71 | 10818.21 |
| 484 | | | | | | | 18 | 11 | 9123.99 | 7104.47 | 17473.69 | 7103.96 |
| 485 | | | | | | 14 | 26 | 13 | 8404.06 | 6171.58 | 13634.67 | 7103.62 |
| 486 | | | | | | 20 | 26 | 11.5 | 5518.28 | 4612.86 | 8526.88 | 4494.5 |
| 487 | | | | | | | 10 | 5 | 29835.05 | 25031.28 | 26538.12 | 11354.2 |
| 488 | | | | | | | 18 | 9 | 30695.57 | 24119.61 | 26994.12 | 11548.5 |
| 489 | | | | | 2 on 1 | 8 | 26 | 13 | 34900.97 | 27865.55 | 30097.2 | 13023.25 |
| 490 | | | | | | | 18 | 6 | 20504.26 | 18960.02 | 18483.69 | 7757.3 |
| 491 | | | | | | 14 | 26 | 10 | 23428.75 | 20690.47 | 20683.11 | 8799.21 |
| 492 | | | | 4x6 | | 20 | 26 | 7 | 13425.97 | 12131.04 | 12129.44 | 5073.68 |
| 493 | | | | | | | 10 | 4.5 | 8552.28 | 4939.92 | 8164.82 | 4091.58 |
| 494 | | | | | | | 18 | 6.5 | 10193.93 | 7231.92 | 11338.74 | 5226.38 |
| 495 | 4000 | 3 | 0 | | 4 on 1 | 8 | 26 | 8.5 | 7180.94 | 4818.38 | 8117.88 | 4151.49 |
| 496 | | | | | | | 18 | 5 | 5824.38 | 3917.28 | 6301.47 | 2783.63 |
| 497 | | | | | | 14 | 26 | 7 | 5203.62 | 3533.52 | 5429.32 | 2805.97 |
| 498 | | | | | | 20 | 26 | 5.5 | 3652.84 | 2479.67 | 3347.65 | 1817.24 |
| 499 | | | | | | | 10 | 9 | 33165.91 | 26998.6 | 27851.76 | 97.23 |
| 500 | | | | | | | 18 | 13 | 37373.21 | 29696.5 | 31442.67 | 13023.25 |
| 501 | | | | | 2 on 1 | 8 | 26 | 17 | 36172.24 | 29479.1 | 30870.91 | 13634.17 |
| 502 | | | | | | | 18 | 10 | 25001.35 | 23010.86 | 21314.96 | 8799.21 |
| 503 | | | | | | 14 | 26 | 14 | 25325.5 | 22166.9 | 21646.58 | 8823.52 |
| 504 | | | | | | 20 | 26 | 11 | 16316.1 | 14499.41 | 14045.09 | 5725.13 |
| 505 | | | | 8x10 | | | 10 | 8.5 | 12501.43 | 6593.09 | 10480.38 | 4151.49 |
| 506 | | | | | 4 on 1 | 8 | 18 | 10.5 | 10911.9 | 7306.75 | 10887.1 | 4158.97 |
| 507 | | | | | | | 26 | 12.5 | 9222.81 | 5868.36 | 9689.37 | 4161.41 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 508 | | | | | | | 18 | 9 | 8079.36 | 5334.19 | 6851.68 | 2813.45 |
| 509 | | | | 8x10 | 4 on 1 | 14 | 26 | 11 | 6793.68 | 4638.11 | 6595.09 | 2815.89 |
| 510 | | | | | | 20 | 26 | 9.5 | 4873.06 | 3216.12 | 4077.58 | 1827.18 |
| 511 | | | | | | | 10 | 11 | 34413.97 | 30154.28 | 29912.9 | 13004.48 |
| 512 | | | | | | | 18 | 15 | 34655.13 | 28935.04 | 29846.13 | 13038.07 |
| 513 | | | | | 2 on 1 | 8 | 26 | 19 | 36206.66 | 29343.39 | 30695.12 | 13634.17 |
| 514 | | | | | | | 18 | 12 | 23381.87 | 22661.15 | 20535.93 | 8815.56 |
| 515 | | | | | | 14 | 26 | 16 | 23495.49 | 22168.36 | 20389.56 | 8822.37 |
| 516 | | | | | | 20 | 26 | 13 | 15232.68 | 14507.85 | 13439.53 | 5725.52 |
| 517 | | | 0 | 10x12 | | | 10 | 10.5 | 7546.03 | 4605.04 | 8590.15 | 4158.97 |
| 518 | | | | | | 8 | 18 | 12.5 | 6806.28 | 4976.51 | 8730.98 | 4161.41 |
| 519 | | | | | 4 on 1 | | 26 | 14.5 | 6075.48 | 4268.16 | 7448.63 | 4161.15 |
| 520 | | | | | | | 18 | 11 | 4926.79 | 3558.26 | 5591.34 | 2815.89 |
| 521 | | | | | | 14 | 26 | 13 | 4363.34 | 3159.02 | 5033.36 | 2815.63 |
| 522 | 4000 | 3 | | | | 20 | 26 | 11.5 | 3051.01 | 2215.36 | 3169.4 | 1826.91 |
| 523 | | | | | | | 10 | 5 | 26660.34 | 21411.33 | 24204.29 | 10168.62 |
| 524 | | | | | | | 18 | 9 | 27071.12 | 20016.75 | 24025.98 | 10272.38 |
| 525 | | | | | 2 on 1 | 8 | 26 | 13 | 30907.4 | 22509.84 | 26783.41 | 11567.49 |
| 526 | | | | | | | 18 | 6 | 17737.77 | 15828.01 | 16222.38 | 6754.8 |
| 527 | | | | | | 14 | 26 | 10 | 20336.94 | 17018.4 | 18224.78 | 7639.11 |
| 528 | | | 3 | 4x6 | | 20 | 26 | 7 | 11242.08 | 9791.89 | 10251.25 | 4287.34 |
| 529 | | | | | | | 10 | 4.5 | 6278.52 | 3428.34 | 7395.79 | 3650.03 |
| 530 | | | | | | | 18 | 6.5 | 6983.66 | 4890.76 | 9423.86 | 4649.44 |
| 531 | | | | | 4 on 1 | 8 | 26 | 8.5 | 4922.61 | 3299.74 | 6295.95 | 3685.67 |
| 532 | | | | | | | 18 | 5 | 3860.88 | 2609.56 | 5300.69 | 2422.03 |
| 533 | | | | | | 14 | 26 | 7 | 3352.92 | 2129.85 | 4046.23 | 2434.23 |
| 534 | | | | | | 20 | 26 | 5.5 | 2251.7 | 1605.18 | 2351.4 | 1534.27 |
| 535 | | | | | | | 10 | 9 | 28557.3 | 21919.76 | 24441.42 | 86.36 |
| 536 | | | | 8x10 | 2 on 1 | | 18 | 13 | 32023.76 | 22622.02 | 27142.46 | 11567.49 |
| 537 | | | | | | 8 | 26 | 17 | 32205.43 | 23798.29 | 27721.27 | 12105.79 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538 | | | | | | | 18 | 10 | 21037.13 | 18325.71 | 18246.48 | 7639.11 |
| 539 | | | | | 2 on 1 | 14 | 26 | 14 | 21094.1 | 17815.75 | 18252.74 | 7652.45 |
| 540 | | | | | | 20 | 26 | 11 | 13279.52 | 11347.32 | 11518.17 | 4827.73 |
| 541 | | | | 8x10 | | | 10 | 8.5 | 8112.72 | 3909.4 | 8285.88 | 3685.67 |
| 542 | | | | | | 8 | 18 | 10.5 | 6859.45 | 4457.55 | 8184.52 | 3690.42 |
| 543 | | | | | 4 on 1 | | 26 | 12.5 | 5938.42 | 3726.36 | 6949.18 | 3692.26 |
| 544 | | | | | | | 18 | 9 | 4868.61 | 3047.58 | 5151.08 | 2438.66 |
| 545 | | | | | | 14 | 26 | 11 | 4090.81 | 2444.9 | 4529.94 | 2440.46 |
| 546 | | | | | | 20 | 26 | 9.5 | 2798.11 | 1855.64 | 2666.66 | 1540.03 |
| 547 | | | | | | | 10 | 11 | 30661.6 | 25111.24 | 26688.36 | 11554.68 |
| 548 | | | | | | | 18 | 15 | 30832.06 | 23111.94 | 26615.36 | 11575.75 |
| 549 | | | 3 | | 2 on 1 | 8 | 26 | 19 | 32229.28 | 24361.26 | 27666.98 | 12105.79 |
| 550 | | | | | | | 18 | 12 | 20350.59 | 18551.76 | 17957.94 | 7646.64 |
| 551 | | | | | | 14 | 26 | 16 | 20409.03 | 18070.25 | 18008.41 | 7651.44 |
| 552 | | | | | | 20 | 26 | 13 | 12889.92 | 11552.14 | 11409.62 | 4828.89 |
| 553 | 4000 | 3 | | 10x12 | | | 10 | 10.5 | 5442.42 | 3259.02 | 7757.73 | 3690.42 |
| 554 | | | | | | 8 | 18 | 12.5 | 4903.86 | 3616.14 | 7781.55 | 3692.26 |
| 555 | | | | | 4 on 1 | | 26 | 14.5 | 4492.02 | 3184.22 | 6280.38 | 3691.95 |
| 556 | | | | | | | 18 | 11 | 3397.3 | 2486.58 | 4930.35 | 2440.46 |
| 557 | | | | | | 14 | 26 | 13 | 3048.67 | 2143.23 | 4109.35 | 2440.2 |
| 558 | | | | | | 20 | 26 | 11.5 | 2027.12 | 1580.21 | 2485.02 | 1539.8 |
| 559 | | | | | | | 10 | 5 | 72996.86 | 57922.8 | 69228.14 | 27954.72 |
| 560 | | | | | | | 18 | 9 | 74072.03 | 53848.37 | 69911.38 | 28245.94 |
| 561 | | | | | 2 on 1 | 8 | 26 | 13 | 84965.18 | 60260.84 | 77343.94 | 31769.67 |
| 562 | | | | | | | 18 | 6 | 48292.9 | 42670.5 | 46347.34 | 18471.31 |
| 563 | | | | | | 14 | 26 | 10 | 55657.19 | 46296.64 | 52026.17 | 20848.64 |
| 564 | | | 6 | 4x6 | | 20 | 26 | 7 | 30768.2 | 26742.45 | 29889.59 | 11730.42 |
| 565 | | | | | | | 10 | 4.5 | 14844.17 | 8731.62 | 22781.19 | 10031.79 |
| 566 | | | | | 4 on 1 | | 18 | 6.5 | 16986.33 | 12419.58 | 30238.42 | 12786.66 |
| 567 | | | | | | 8 | 26 | 8.5 | 12270.6 | 8769.16 | 19466.51 | 10126.72 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 568 | | | | | | | 18 | 5 | 9219.34 | 6602.57 | 15591.69 | 6621.89 |
| 569 | | | | 4x6 | 4 on 1 | 14 | 26 | 7 | 8297.58 | 5565.03 | 11984.69 | 6646.13 |
| 570 | | | | | | 20 | 26 | 5.5 | 5469.61 | 4219.67 | 7172.42 | 4200.96 |
| 571 | | | | | | | 10 | 9 | 76873.85 | 58749.35 | 70201.73 | 238.82 |
| 572 | | | | | | | 18 | 13 | 87230.61 | 60165.07 | 78161.02 | 31769.67 |
| 573 | | | | | 2 on 1 | 8 | 26 | 17 | 88639.73 | 63421.72 | 80356.95 | 33234.15 |
| 574 | | | | | | | 18 | 10 | 57042.92 | 48910.57 | 52262.73 | 20848.64 |
| 575 | | | | | | 14 | 26 | 14 | 57260.43 | 48460.77 | 52564.71 | 20868.53 |
| 576 | | | | | | 20 | 26 | 11 | 36127.14 | 30654.56 | 33597.68 | 13202.69 |
| 577 | | | 6 | 8x10 | | | 10 | 8.5 | 18872.33 | 9807.88 | 25425.94 | 10126.72 |
| 578 | | | | | | 8 | 18 | 10.5 | 16501.29 | 11395.87 | 25857.11 | 10137.24 |
| 579 | | | | | 4 on 1 | | 26 | 12.5 | 14634.62 | 10036.99 | 20974.96 | 10138.62 |
| 580 | | | | | | | 18 | 9 | 11504.36 | 7637.84 | 16163.1 | 6656.25 |
| 581 | | | | | | 14 | 26 | 11 | 10010.48 | 6381.77 | 13307.29 | 6657.48 |
| 582 | 4000 | 3 | | | | 20 | 26 | 9.5 | 6711.33 | 4944.32 | 8131.83 | 4212.33 |
| 583 | | | | | | | 10 | 11 | 84486.43 | 67836.3 | 77841.45 | 31735.85 |
| 584 | | | | | | | 18 | 15 | 84843.04 | 62001.95 | 77274.97 | 31782.64 |
| 585 | | | | | 2 on 1 | 8 | 26 | 19 | 88699.14 | 64792.94 | 80182.52 | 33234.15 |
| 586 | | | | | | | 18 | 12 | 55655.77 | 49977.05 | 51996.62 | 20864.15 |
| 587 | | | | | | 14 | 26 | 16 | 55801.98 | 48804.98 | 52199.75 | 20867.06 |
| 588 | | | | | | 20 | 26 | 13 | 35311.37 | 31249.27 | 33465.59 | 13202.33 |
| 589 | | | | 10x12 | | | 10 | 10.5 | 13704.17 | 8665.25 | 25846.22 | 10137.24 |
| 590 | | | | | | 8 | 18 | 12.5 | 12546.14 | 9703.04 | 26164.06 | 10138.62 |
| 591 | | | | | 4 on 1 | | 26 | 14.5 | 11688.13 | 8743.24 | 20111.9 | 10138.28 |
| 592 | | | | | | | 18 | 11 | 8550.54 | 6657.96 | 16375.47 | 6657.48 |
| 593 | | | | | | 14 | 26 | 13 | 7875.87 | 5783.7 | 12777.73 | 6657.16 |
| 594 | | | | | | 20 | 26 | 11.5 | 5171.46 | 4322.94 | 7990.96 | 4212.02 |
| 595 | | | | | | | 10 | 5 | 22798.65 | 18190.17 | 18990.55 | 8676.39 |
| 596 | 8000 | 0 | 0 | 4x6 | 2 on 1 | | 18 | 9 | 23456.23 | 17952.75 | 18957.63 | 8824.87 |
| 597 | | | | | | 8 | 26 | 13 | 26669.82 | 21293.65 | 21176.02 | 9951.81 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 598 | | | | | | | 18 | 6 | 15668.47 | 14265.67 | 13346.73 | 5927.79 |
| 599 | | | | | 2 on 1 | 14 | 26 | 10 | 17903.24 | 15810.77 | 14800.8 | 6723.97 |
| 600 | | | | 4x6 | | 20 | 26 | 7 | 10259.55 | 9090.02 | 8785.43 | 3877.09 |
| 601 | | | | | | | 10 | 4.5 | 6535.28 | 3234.72 | 5157.47 | 3126.61 |
| 602 | | | | | | | 18 | 6.5 | 6149.86 | 3485.11 | 5688.68 | 3155.33 |
| 603 | | | | | 4 on 1 | 8 | 26 | 8.5 | 5487.37 | 2868.4 | 5501.75 | 3172.39 |
| 604 | | | | | | | 18 | 5 | 4450.74 | 2670.23 | 3567.59 | 2127.13 |
| 605 | | | | | | 14 | 26 | 7 | 3976.38 | 3054.98 | 3717.15 | 2144.2 |
| 606 | | | | | | 20 | 26 | 5.5 | 2791.35 | 1888.11 | 2292.66 | 1388.66 |
| 607 | | | | | | | 10 | 9 | 25341.44 | 19328.62 | 19448.22 | 8824.87 |
| 608 | | | | | | | 18 | 13 | 28558.99 | 22282.36 | 22076.59 | 9951.81 |
| 609 | | | | | 2 on 1 | 8 | 26 | 17 | 27641.26 | 22526.66 | 21441.05 | 10418.73 |
| 610 | | | | | | | 18 | 10 | 19104.95 | 16816.8 | 15255.84 | 6723.97 |
| 611 | | | | | | 14 | 26 | 14 | 19352.65 | 16939.8 | 15260.38 | 6742.56 |
| 612 | | | | | | 20 | 26 | 11 | 12468.06 | 10575.97 | 10024.6 | 4374.9 |
| 613 | 8000 | 0 | 0 | 8x10 | | | 10 | 8.5 | 9553.05 | 8335.62 | 6654.72 | 3172.39 |
| 614 | | | | | | 8 | 18 | 10.5 | 8338.4 | 5314.45 | 6857.01 | 3178.1 |
| 615 | | | | | 4 on 1 | | 26 | 12.5 | 7047.67 | 3520.88 | 6603.27 | 3179.97 |
| 616 | | | | | | | 18 | 9 | 6173.9 | 3570.39 | 4388.98 | 2149.91 |
| 617 | | | | | | 14 | 26 | 11 | 5191.43 | 3810.59 | 4462.84 | 2151.78 |
| 618 | | | | | | 20 | 26 | 9.5 | 3723.78 | 2800.35 | 2817.83 | 1396.25 |
| 619 | | | | | | | 10 | 11 | 26297.67 | 21796.54 | 21043.91 | 9937.46 |
| 620 | | | | | | | 18 | 15 | 26481.96 | 21923.37 | 20897.96 | 9963.13 |
| 621 | | | | | 2 on 1 | 8 | 26 | 19 | 27667.57 | 22422.95 | 21347.81 | 10418.64 |
| 622 | | | | | | | 18 | 12 | 17867.41 | 17143.56 | 14587.67 | 6736.47 |
| 623 | | | | | | 14 | 26 | 16 | 18697.27 | 17024.91 | 14906.53 | 7049.8 |
| 624 | | | | | | 20 | 26 | 13 | 11640.16 | 10894.59 | 9557.99 | 4375.19 |
| 625 | | | | 10x12 | | | 10 | 10.5 | 5766.35 | 3169.18 | 5258.01 | 3178.1 |
| 626 | | | | | 4 on 1 | 8 | 18 | 12.5 | 5201.07 | 3571.43 | 5319.3 | 3179.97 |
| 627 | | | | | | | 26 | 14.5 | 4642.62 | 2609.3 | 4936.04 | 3179.77 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 628 | | | | | | | 18 | 11 | 3764.84 | 2481.69 | 4389.23 | 2151.78 |
| 629 | | | 0 | 10x12 | 4 on 1 | 14 | 26 | 13 | 3334.28 | 2641.93 | 3327.66 | 2151.58 |
| 630 | | | | | | 20 | 26 | 11.5 | 2331.48 | 1897.09 | 2129.27 | 1396.04 |
| 631 | | | | | | | 10 | 5 | 20372.68 | 15314.1 | 18249.5 | 7770.42 |
| 632 | | | | | | | 18 | 9 | 20686.58 | 14951.86 | 18092.43 | 7849.71 |
| 633 | | | | | 2 on 1 | 8 | 26 | 13 | 23618.1 | 17201.05 | 20171.7 | 8839.38 |
| 634 | | | | | | | 18 | 6 | 13554.44 | 11906.18 | 12291.17 | 5161.73 |
| 635 | | | | | | 14 | 26 | 10 | 15540.61 | 13004.73 | 13727.42 | 5837.48 |
| 636 | | | | 4x6 | | 20 | 26 | 7 | 8590.72 | 7509.81 | 7755.91 | 3276.2 |
| 637 | | | | | | | 10 | 4.5 | 4797.77 | 2205.61 | 5965.15 | 2789.19 |
| 638 | | | | | | | 18 | 6.5 | 4214.13 | 2000.04 | 6003.67 | 2807.02 |
| 639 | | | | | 4 on 1 | 8 | 26 | 8.5 | 3761.64 | 1848.05 | 3958.36 | 2816.43 |
| 640 | | | | | | | 18 | 5 | 2950.32 | 1749.42 | 3701.2 | 1850.81 |
| 641 | | | | | | 14 | 26 | 7 | 2562.16 | 1937.85 | 2579.04 | 1860.14 |
| 642 | 8000 | 0 | | | | 20 | 26 | 5.5 | 1720.65 | 1068.75 | 1510.15 | 1172.42 |
| 643 | | | | | | | 10 | 9 | 21816.29 | 15588.01 | 18364.8 | 7849.71 |
| 644 | | | | | | | 18 | 13 | 24471.18 | 17560.63 | 20460.88 | 8839.38 |
| 645 | | | | | 2 on 1 | 8 | 26 | 17 | 24610 | 18185.63 | 20812.05 | 9250.82 |
| 646 | | | | | | | 18 | 10 | 16075.67 | 13620.42 | 13843.88 | 5837.48 |
| 647 | | | | | | 14 | 26 | 14 | 16119.2 | 13614.27 | 13564.37 | 5847.67 |
| 648 | | | | | | 20 | 26 | 11 | 10147.63 | 8186.33 | 8703.31 | 3689.15 |
| 649 | | | 3 | 8x10 | | | 10 | 8.5 | 6199.39 | 5622.19 | 6701.32 | 2816.43 |
| 650 | | | | | | 8 | 18 | 10.5 | 5241.69 | 2816.64 | 6625.24 | 2820.06 |
| 651 | | | | | 4 on 1 | | 26 | 12.5 | 4537.88 | 1999.7 | 4340.49 | 2821.46 |
| 652 | | | | | | | 18 | 9 | 3720.38 | 1987.86 | 4111.64 | 1863.52 |
| 653 | | | | | | 14 | 26 | 11 | 3126.02 | 2221.25 | 2836.7 | 1864.89 |
| 654 | | | | | | 20 | 26 | 9.5 | 2138.19 | 1558.16 | 1698.99 | 1176.83 |
| 655 | | | | | | | 10 | 11 | 23430.27 | 17622.77 | 20134.28 | 8829.58 |
| 656 | | | | 10x12 | 2 on 1 | | 18 | 15 | 23560.53 | 17762.27 | 20011.66 | 8845.69 |
| 657 | | | | | | 8 | 26 | 19 | 24628.23 | 18615.82 | 20715.09 | 9250.72 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 658 | | | | | | | 18 | 12 | 15551.04 | 14142.54 | 13473.61 | 5843.23 |
| 659 | | | | | 2 on 1 | 14 | 26 | 16 | 16271.82 | 14237.83 | 13808.91 | 6114.14 |
| 660 | | | | | | 20 | 26 | 13 | 9849.92 | 8883.91 | 8617.08 | 3690.03 |
| 661 | | | 3 | 10x12 | | | 10 | 10.5 | 4158.87 | 2288.57 | 6339.11 | 2820.06 |
| 662 | | | | | | 8 | 18 | 12.5 | 3747.32 | 2394.41 | 6314.79 | 2821.46 |
| 663 | | | | | 4 on 1 | | 26 | 14.5 | 3432.61 | 1821.48 | 3841.83 | 2821.23 |
| 664 | | | | | | | 18 | 11 | 2596.07 | 1719.3 | 3976.53 | 1864.89 |
| 665 | | | | | | 14 | 26 | 13 | 2329.66 | 1849.29 | 2510.79 | 1864.7 |
| 666 | | | | | | 20 | 26 | 11.5 | 1549.04 | 1274.12 | 1538.2 | 1176.65 |
| 667 | | | | | | | 10 | 5 | 55781.05 | 42010.68 | 53004.54 | 21361.79 |
| 668 | | | | | | | 18 | 9 | 56602.64 | 40360.2 | 53358.55 | 21584.33 |
| 669 | | | | | 2 on 1 | 8 | 26 | 13 | 64926.71 | 46048.73 | 59001.47 | 24277.01 |
| 670 | | | | | | | 18 | 6 | 36903.35 | 32484.58 | 35380.41 | 14114.98 |
| 671 | | | | | | 14 | 26 | 10 | 42530.82 | 35377.89 | 39637 | 15931.63 |
| 672 | | | | 4x6 | | 20 | 26 | 7 | 23511.72 | 20610.37 | 22752.31 | 8963.88 |
| 673 | | | | | | | 10 | 4.5 | 11343.27 | 5849.26 | 18974.45 | 7665.86 |
| 674 | | | | | | | 18 | 6.5 | 10251.47 | 5101.51 | 19868.52 | 7719.8 |
| 675 | 8000 | 0 | 6 | | 4 on 1 | 8 | 26 | 8.5 | 9376.67 | 4859.68 | 11695.42 | 7738.4 |
| 676 | | | | | | | 18 | 5 | 7045.02 | 4615.33 | 11681.77 | 5060.16 |
| 677 | | | | | | 14 | 26 | 7 | 6340.65 | 5157.32 | 7329.12 | 5078.69 |
| 678 | | | | | | 20 | 26 | 5.5 | 4179.64 | 2823.27 | 4482.1 | 3210.19 |
| 679 | | | | | | | 10 | 9 | 58761.54 | 42323.29 | 53602.12 | 21584.33 |
| 680 | | | | | | | 18 | 13 | 66657.86 | 47207 | 59355.47 | 24277.01 |
| 681 | | | | | 2 on 1 | 8 | 26 | 17 | 67734.65 | 48464.14 | 60747.83 | 25396.22 |
| 682 | | | | | | | 18 | 10 | 43589.73 | 36906.61 | 39972.63 | 15931.63 |
| 683 | | | | | | 14 | 26 | 14 | 43755.95 | 37031.8 | 39659.5 | 15946.83 |
| 684 | | | | | | 20 | 26 | 11 | 27606.8 | 21958.18 | 25524.37 | 10088.92 |
| 685 | | | | 8x10 | | | 10 | 8.5 | 14421.42 | 14758.41 | 20920.68 | 7738.4 |
| 686 | | | | | 4 on 1 | 8 | 18 | 10.5 | 12609.57 | 7192.87 | 21285.6 | 7746.44 |
| 687 | | | | | | | 26 | 12.5 | 11183.14 | 5176.8 | 12426.1 | 7747.5 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 688 | | | | | | | 18 | 9 | 8791.14 | 5224.39 | 13250.42 | 5086.42 |
| 689 | | | | 8x10 | 4 on 1 | 14 | 26 | 11 | 7649.57 | 5899.05 | 8016.53 | 5087.36 |
| 690 | | | | | | 20 | 26 | 9.5 | 5128.51 | 4097.64 | 5073.76 | 3218.88 |
| 691 | | | | | | | 10 | 11 | 64560.88 | 48070.68 | 58970.1 | 24251.16 |
| 692 | | | | | | | 18 | 15 | 64833.38 | 47927.52 | 58981.76 | 24286.92 |
| 693 | | 0 | 6 | | 2 on 1 | 8 | 26 | 19 | 67780.05 | 49511.96 | 60572.96 | 25396.1 |
| 694 | | | | | | | 18 | 12 | 42529.73 | 38374.61 | 39513.88 | 15943.48 |
| 695 | | | | | | 14 | 26 | 16 | 44504.74 | 38467.38 | 40731.75 | 16674.15 |
| 696 | | | | | | 20 | 26 | 13 | 26983.42 | 24195.02 | 25458.34 | 10088.65 |
| 697 | | | | 10x12 | | | 10 | 10.5 | 10472.13 | 6228.08 | 21398.29 | 7746.44 |
| 698 | | | | | | 8 | 18 | 12.5 | 9587.21 | 6397.5 | 21693.08 | 7747.5 |
| 699 | | | | | 4 on 1 | | 26 | 14.5 | 8931.56 | 4864.04 | 11722.16 | 7747.24 |
| 700 | | | | | | | 18 | 11 | 6533.96 | 4717.44 | 13551.32 | 5087.36 |
| 701 | | | | | | 14 | 26 | 13 | 6018.4 | 5116.14 | 7564.52 | 5087.11 |
| 702 | | | | | | 20 | 26 | 11.5 | 3951.81 | 3471.26 | 4783.21 | 3218.64 |
| 703 | 8000 | | | | | | 10 | 5 | 25069.54 | 20002.02 | 20882.13 | 9540.61 |
| 704 | | | | | | | 18 | 9 | 25792.62 | 19740.96 | 20845.93 | 9703.88 |
| 705 | | | | | 2 on 1 | 8 | 26 | 13 | 29326.3 | 23414.63 | 23285.29 | 10943.07 |
| 706 | | | | | | | 18 | 6 | 17229.15 | 15686.62 | 14676.16 | 6518.24 |
| 707 | | | | | | 14 | 26 | 10 | 19686.51 | 17385.62 | 16275.05 | 7393.72 |
| 708 | | 3 | 0 | 4x6 | | 20 | 26 | 7 | 11281.46 | 9995.44 | 9660.51 | 4263.27 |
| 709 | | | | | | | 10 | 4.5 | 7186.23 | 3556.92 | 5671.18 | 3438.04 |
| 710 | | | | | | | 18 | 6.5 | 6762.43 | 3832.25 | 6255.31 | 3469.62 |
| 711 | | | | | 4 on 1 | 8 | 26 | 8.5 | 6033.94 | 3154.11 | 6049.76 | 3488.38 |
| 712 | | | | | | | 18 | 5 | 4894.06 | 2936.2 | 3922.94 | 2339.01 |
| 713 | | | | | | 14 | 26 | 7 | 4372.45 | 3359.28 | 4087.41 | 2357.77 |
| 714 | | | | | | 20 | 26 | 5.5 | 3069.38 | 2076.18 | 2521.02 | 1526.98 |
| 715 | | | | | | | 10 | 9 | 27865.61 | 21253.87 | 21385.38 | 9703.88 |
| 716 | | | | 8x10 | 2 on 1 | | 18 | 13 | 31403.65 | 24501.82 | 24275.55 | 10943.07 |
| 717 | | | | | | 8 | 26 | 17 | 30394.51 | 24770.45 | 23576.71 | 11456.5 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 718 | 8000 | 3 | 0 | 8x10 | 2 on 1 | 14 | 18 | 10 | 21007.92 | 18491.86 | 16775.42 | 7393.72 |
| 719 | | | | | | | 26 | 14 | 21280.3 | 18627.12 | 16780.41 | 7414.16 |
| 720 | | | | | | 20 | 26 | 11 | 13709.95 | 11629.4 | 11023.11 | 4810.66 |
| 721 | | | | | 4 on 1 | 8 | 10 | 8.5 | 10504.6 | 9165.9 | 7317.57 | 3488.38 |
| 722 | | | | | | | 18 | 10.5 | 9168.96 | 5843.8 | 7540.01 | 3494.66 |
| 723 | | | | | | | 26 | 12.5 | 7749.66 | 3871.58 | 7261 | 3496.72 |
| 724 | | | | | | 14 | 18 | 9 | 6788.86 | 3926.03 | 4826.15 | 2364.06 |
| 725 | | | | | | | 26 | 11 | 5708.53 | 4190.15 | 4907.37 | 2366.12 |
| 726 | | | | | | 20 | 26 | 9.5 | 4094.7 | 3079.29 | 3098.5 | 1535.32 |
| 727 | | | | 10x12 | 2 on 1 | 8 | 10 | 11 | 28917.08 | 23967.61 | 23140.01 | 10927.29 |
| 728 | | | | | | | 18 | 15 | 29119.73 | 24107.07 | 22979.53 | 10955.52 |
| 729 | | | | | | | 26 | 19 | 30423.43 | 24656.42 | 23474.19 | 11456.4 |
| 730 | | | | | | 14 | 18 | 12 | 19647.12 | 18851.17 | 16040.69 | 7407.47 |
| 731 | | | | | | | 26 | 16 | 20559.63 | 18720.7 | 16391.31 | 7752.01 |
| 732 | | | | | | 20 | 26 | 13 | 12799.59 | 11979.76 | 10510.03 | 4810.99 |
| 733 | | | | | 4 on 1 | 8 | 10 | 10.5 | 6340.72 | 3484.85 | 5781.74 | 3494.66 |
| 734 | | | | | | | 18 | 12.5 | 5719.13 | 3921.82 | 5849.13 | 3496.72 |
| 735 | | | | | | | 26 | 14.5 | 5105.05 | 2869.2 | 5427.7 | 3496.49 |
| 736 | | | | | | 14 | 18 | 11 | 4139.84 | 2728.88 | 3819.84 | 2366.12 |
| 737 | | | | | | | 26 | 13 | 3666.39 | 2905.08 | 3659.11 | 2365.89 |
| 738 | | | | | | 20 | 26 | 11.5 | 2563.7 | 2086.05 | 2341.36 | 1535.1 |
| 739 | | | 3 | 4x6 | 2 on 1 | 8 | 10 | 5 | 22401.93 | 16839.48 | 18687.86 | 8544.4 |
| 740 | | | | | | | 18 | 9 | 22747.09 | 16441.16 | 18263.5 | 8631.59 |
| 741 | | | | | | | 26 | 13 | 25970.61 | 18914.38 | 20100.35 | 9719.83 |
| 742 | | | | | | 14 | 18 | 6 | 14904.55 | 13092.11 | 12720.38 | 5675.87 |
| 743 | | | | | | | 26 | 10 | 17088.55 | 14300.08 | 14025.38 | 6418.92 |
| 744 | | | | | | 20 | 26 | 7 | 9446.41 | 8257.84 | 8058.66 | 3602.53 |
| 745 | | | | | 4 on 1 | 8 | 10 | 4.5 | 5275.66 | 2425.3 | 4915.96 | 3067.01 |
| 746 | | | | | | | 18 | 6.5 | 4633.88 | 2199.26 | 4848.56 | 3086.62 |
| 747 | | | | | | | 26 | 8.5 | 4136.33 | 2032.13 | 4352.64 | 3096.97 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 748 | | | | | | | 18 | 5 | 3244.19 | 1923.67 | 3114.19 | 2035.16 |
| 749 | | | | 4x6 | 4 on 1 | 14 | 26 | 7 | 2817.36 | 2130.88 | 2835.93 | 2045.42 |
| 750 | | | | | | 20 | 26 | 5.5 | 1892.04 | 1175.2 | 1660.57 | 1289.21 |
| 751 | | | | | | | 10 | 9 | 23989.32 | 17140.68 | 18551.4 | 8631.59 |
| 752 | | | | | | | 18 | 13 | 26908.66 | 19309.78 | 20416.65 | 9719.83 |
| 753 | | | | | 2 on 1 | 8 | 26 | 17 | 27061.31 | 19997.03 | 20751.32 | 10172.25 |
| 754 | | | | | | | 18 | 10 | 17676.9 | 14977.1 | 14082.99 | 6418.92 |
| 755 | | | | | | 14 | 26 | 14 | 17724.78 | 14970.34 | 13838.03 | 6430.14 |
| 756 | | | | | | 20 | 26 | 11 | 11158.4 | 9001.74 | 8988.49 | 4056.61 |
| 757 | | | 3 | 8x10 | | | 10 | 8.5 | 6816.89 | 6182.2 | 5374.31 | 3096.97 |
| 758 | | | | | | 8 | 18 | 10.5 | 5763.8 | 3097.2 | 5200.84 | 3100.96 |
| 759 | | | | | 4 on 1 | | 26 | 12.5 | 4989.88 | 2198.88 | 4772.83 | 3102.5 |
| 760 | | | | | | | 18 | 9 | 4090.95 | 2185.86 | 3332.75 | 2049.13 |
| 761 | | | | | | 14 | 26 | 11 | 3437.39 | 2442.5 | 3119.26 | 2050.65 |
| 762 | 8000 | 3 | | | | 20 | 26 | 9.5 | 2351.17 | 1713.37 | 1868.22 | 1294.05 |
| 763 | | | | | | | 10 | 11 | 25764.07 | 19378.11 | 20309.41 | 9709.07 |
| 764 | | | | | | | 18 | 15 | 25907.3 | 19531.5 | 19982.19 | 9726.78 |
| 765 | | | | | 2 on 1 | 8 | 26 | 19 | 27081.35 | 20470.08 | 20522.78 | 10172.15 |
| 766 | | | | | | | 18 | 12 | 17100.02 | 15551.23 | 13770.78 | 6425.26 |
| 767 | | | | | | 14 | 26 | 16 | 17892.59 | 15656.01 | 14022.42 | 6723.15 |
| 768 | | | | | | 20 | 26 | 13 | 10831.04 | 9768.8 | 8797.17 | 4057.58 |
| 769 | | | | 10x12 | | | 10 | 10.5 | 4573.11 | 2516.52 | 4814.88 | 3100.96 |
| 770 | | | | | | 8 | 18 | 12.5 | 4120.58 | 2632.9 | 4801.15 | 3102.5 |
| 771 | | | | | 4 on 1 | | 26 | 14.5 | 3774.52 | 2002.92 | 4224.5 | 3102.24 |
| 772 | | | | | | | 18 | 11 | 2854.66 | 1890.55 | 3105.46 | 2050.65 |
| 773 | | | | | | 14 | 26 | 13 | 2561.71 | 2033.49 | 2760.88 | 2050.43 |
| 774 | | | | | | 20 | 26 | 11.5 | 1703.33 | 1401.03 | 1691.42 | 1293.85 |
| 775 | | | 6 | 4x6 | 2 on 1 | | 10 | 5 | 61337.19 | 46195.21 | 52476.55 | 23489.56 |
| 776 | | | | | | | 18 | 9 | 62240.62 | 44380.33 | 51915.54 | 23734.26 |
| 777 | | | | | | 8 | 26 | 13 | 71393.83 | 50635.48 | 57672.87 | 26695.15 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 778 | | | | | | | 18 | 6 | 40579.16 | 35720.25 | 35714.11 | 15520.92 |
| 779 | | | | | 2 on 1 | 14 | 26 | 10 | 46767.16 | 38901.75 | 39748.14 | 17518.52 |
| 780 | | | | 4x6 | | 20 | 26 | 7 | 25853.64 | 22663.29 | 23216.12 | 9856.74 |
| 781 | | | | | | | 10 | 4.5 | 12473.13 | 6431.88 | 14338.02 | 8429.43 |
| 782 | | | | | | | 18 | 6.5 | 11272.58 | 5609.66 | 14652.16 | 8488.74 |
| 783 | | | | | 4 on 1 | 8 | 26 | 8.5 | 10310.64 | 5343.73 | 12860.35 | 8509.2 |
| 784 | | | | | | | 18 | 5 | 7746.75 | 5075.05 | 9079.13 | 5564.19 |
| 785 | | | | | | 14 | 26 | 7 | 6972.22 | 5671.02 | 8059.14 | 5584.56 |
| 786 | | | | | | 20 | 26 | 5.5 | 4595.96 | 3104.49 | 4928.55 | 3529.95 |
| 787 | | | | | | | 10 | 9 | 64614.56 | 46538.96 | 52632.83 | 23734.26 |
| 788 | | | | | | | 18 | 13 | 73297.41 | 51909.11 | 58236 | 26695.15 |
| 789 | | | | | 2 on 1 | 8 | 26 | 17 | 74481.45 | 53291.47 | 59424.47 | 27925.84 |
| 790 | | | | | | | 18 | 10 | 47931.54 | 40582.74 | 39893.45 | 17518.52 |
| 791 | | | | | | 14 | 26 | 14 | 48114.32 | 40720.4 | 39159.83 | 17535.23 |
| 792 | | | | | | 20 | 26 | 11 | 30356.61 | 24145.35 | 25807.61 | 11093.84 |
| 793 | 8000 | 3 | 6 | 8x10 | | | 10 | 8.5 | 15857.88 | 16228.44 | 15561.66 | 8509.2 |
| 794 | | | | | | 8 | 18 | 10.5 | 13865.56 | 7909.33 | 15488.12 | 8518.04 |
| 795 | | | | | 4 on 1 | | 26 | 12.5 | 12297.06 | 5692.44 | 13663.82 | 8519.2 |
| 796 | | | | | | | 18 | 9 | 9666.79 | 5744.78 | 9987.42 | 5593.06 |
| 797 | | | | | | 14 | 26 | 11 | 8411.52 | 6486.63 | 8815.03 | 5594.09 |
| 798 | | | | | | 20 | 26 | 9.5 | 5639.34 | 4505.79 | 5579.14 | 3539.5 |
| 799 | | | | | | | 10 | 11 | 70991.55 | 52858.82 | 57985.58 | 26666.73 |
| 800 | | | | | | | 18 | 15 | 71291.2 | 52701.41 | 57082.77 | 26706.05 |
| 801 | | | | | 2 on 1 | 8 | 26 | 19 | 74531.37 | 54443.67 | 59015.09 | 27925.71 |
| 802 | | | | | | | 18 | 12 | 46765.96 | 42196.96 | 39289.61 | 17531.55 |
| 803 | | | | | | 14 | 26 | 16 | 48937.69 | 42298.97 | 40494.82 | 18335 |
| 804 | | | | | | 20 | 26 | 13 | 29671.14 | 26605 | 25558.22 | 11093.54 |
| 805 | | | | 10x12 | | | 10 | 10.5 | 11515.22 | 6848.43 | 15483.29 | 8518.04 |
| 806 | | | | | 4 on 1 | 8 | 18 | 12.5 | 10542.16 | 7034.74 | 15551.41 | 8519.2 |
| 807 | | | | | | | 26 | 14.5 | 9821.2 | 5348.53 | 12889.76 | 8518.91 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 808 | | | | | | | 18 | 11 | 7184.78 | 5187.33 | 9964.65 | 5594.09 |
| 809 | 8000 | 3 | 6 | 10x12 | 4 on 1 | 14 | 26 | 13 | 6617.87 | 5625.74 | 8318 | 5593.82 |
| 810 | | | | | | 20 | 26 | 11.5 | 4345.43 | 3817.02 | 5259.65 | 3539.24 |
| 811 | | | | | | | 10 | 5 | 24852.58 | 19828.91 | 21291.74 | 9458.04 |
| 812 | | | | | | | 18 | 9 | 25569.39 | 19570.11 | 21346.87 | 9619.89 |
| 813 | | | | | 2 on 1 | 8 | 26 | 13 | 29072.49 | 23211.98 | 23497.68 | 10848.36 |
| 814 | | | | | | | 18 | 6 | 17080.04 | 15550.85 | 14759.28 | 6461.82 |
| 815 | | | | | | 14 | 26 | 10 | 19516.13 | 17235.15 | 16272.67 | 7329.73 |
| 816 | | | | 4x6 | | 20 | 26 | 7 | 11183.82 | 9908.93 | 9708.34 | 4226.37 |
| 817 | | | | | | | 10 | 4.5 | 7124.04 | 3526.14 | 7029.63 | 3408.28 |
| 818 | | | | | | | 18 | 6.5 | 6703.9 | 3799.08 | 7702.28 | 3439.59 |
| 819 | | | | | 4 on 1 | 8 | 26 | 8.5 | 5981.72 | 3126.81 | 7073.43 | 3458.19 |
| 820 | | | | | | | 18 | 5 | 4851.7 | 2910.79 | 4693.95 | 2318.76 |
| 821 | | | | | | 14 | 26 | 7 | 4334.61 | 3330.2 | 4624.33 | 2337.37 |
| 822 | 12000 | 0 | | | | 20 | 26 | 5.5 | 3042.82 | 2058.21 | 2823.3 | 1513.76 |
| 823 | | | | | | | 10 | 9 | 27624.44 | 21069.93 | 21817.07 | 9619.89 |
| 824 | | | | | | | 18 | 13 | 31131.86 | 24289.77 | 24249.93 | 10848.36 |
| 825 | | | | | 2 on 1 | 8 | 26 | 17 | 30131.45 | 24556.07 | 23878.58 | 11357.35 |
| 826 | | | | | | | 18 | 10 | 20826.11 | 18331.81 | 16682.79 | 7329.73 |
| 827 | | | | | | 14 | 26 | 14 | 21096.13 | 18465.9 | 16782.68 | 7349.99 |
| 828 | | | | | | 20 | 26 | 11 | 13591.3 | 11528.75 | 11009.98 | 4769.03 |
| 829 | | | 0 | 8x10 | | | 10 | 8.5 | 10413.68 | 9086.57 | 8784.45 | 3458.19 |
| 830 | | | | | | 8 | 18 | 10.5 | 9089.6 | 5793.22 | 9082.52 | 3464.42 |
| 831 | | | | | 4 on 1 | | 26 | 12.5 | 7682.59 | 3838.07 | 8243.82 | 3466.46 |
| 832 | | | | | | | 18 | 9 | 6730.1 | 3892.05 | 5717.04 | 2343.6 |
| 833 | | | | | | 14 | 26 | 11 | 5659.13 | 4153.88 | 5482.27 | 2345.64 |
| 834 | | | | | | 20 | 26 | 9.5 | 4059.26 | 3052.64 | 3411.04 | 1522.04 |
| 835 | | | | | | | 10 | 11 | 28666.81 | 23760.18 | 23349.75 | 10832.72 |
| 836 | | | | 10x12 | 2 on 1 | | 18 | 15 | 28867.71 | 23898.43 | 23104.21 | 10860.7 |
| 837 | | | | | | 8 | 26 | 19 | 30160.13 | 24443.03 | 23873.69 | 11357.25 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 838 | | | | | | | 18 | 12 | 19477.08 | 18688.02 | 16203.66 | 7343.36 |
| 839 | | | | | 2 on 1 | 14 | 26 | 16 | 20381.7 | 18558.67 | 16521.13 | 7684.91 |
| 840 | | | | | | 20 | 26 | 13 | 12688.82 | 11876.08 | 10516.03 | 4769.35 |
| 841 | | | 0 | 10x12 | | | 10 | 10.5 | 6285.84 | 3454.69 | 7752.04 | 3464.42 |
| 842 | | | | | | 8 | 18 | 12.5 | 5669.63 | 3887.87 | 7886.88 | 3466.46 |
| 843 | | | | | 4 on 1 | | 26 | 14.5 | 5060.87 | 2844.37 | 6598 | 3466.23 |
| 844 | | | | | | | 18 | 11 | 4104.01 | 2705.26 | 5054.16 | 2345.64 |
| 845 | | | | | | 14 | 26 | 13 | 3634.66 | 2879.94 | 4388.94 | 2445.51 |
| 846 | | | | | | 20 | 26 | 11.5 | 2541.52 | 2068 | 2759.03 | 1521.81 |
| 847 | | | | | | | 10 | 5 | 22208.05 | 16693.74 | 19527.76 | 8470.46 |
| 848 | | | | | | | 18 | 9 | 22550.22 | 16298.87 | 19317.76 | 8556.88 |
| 849 | | | | | 2 on 1 | 8 | 26 | 13 | 25745.84 | 18750.68 | 21262.04 | 9635.71 |
| 850 | | | | | | | 18 | 6 | 14775.55 | 12978.81 | 13128.91 | 5626.75 |
| 851 | | | | | | 14 | 26 | 10 | 16940.65 | 14176.32 | 14355.08 | 6363.37 |
| 852 | | | | 4x6 | | 20 | 26 | 7 | 9364.65 | 8186.37 | 8353.65 | 3571.35 |
| 853 | | | | | | | 10 | 4.5 | 5230 | 2404.31 | 7031.27 | 3040.47 |
| 854 | | | | | | | 18 | 6.5 | 4593.78 | 2180.22 | 7226.1 | 3059.91 |
| 855 | 12000 | 0 | 3 | | 4 on 1 | 8 | 26 | 8.5 | 4100.53 | 2014.54 | 5932.87 | 3070.16 |
| 856 | | | | | | | 18 | 5 | 3216.11 | 1907.02 | 4333.77 | 2017.55 |
| 857 | | | | | | 14 | 26 | 7 | 2792.98 | 2112.43 | 3726.33 | 2027.71 |
| 858 | | | | | | 20 | 26 | 5.5 | 1875.67 | 1165.03 | 2147.92 | 1278.05 |
| 859 | | | | | | | 10 | 9 | 23781.7 | 16992.33 | 19820.57 | 8556.88 |
| 860 | | | | | | | 18 | 13 | 26675.77 | 19142.66 | 21539.72 | 9635.71 |
| 861 | | | | | 2 on 1 | 8 | 26 | 17 | 26827.1 | 19823.96 | 21871.53 | 10084.22 |
| 862 | | | | | | | 18 | 10 | 17523.92 | 14847.48 | 14623.6 | 6363.37 |
| 863 | | | | 8x10 | | 14 | 26 | 14 | 17571.37 | 14840.77 | 14340.48 | 6374.49 |
| 864 | | | | | | 20 | 26 | 11 | 11061.83 | 8923.84 | 9310.87 | 4021.5 |
| 865 | | | | | | | 10 | 8.5 | 6757.89 | 6128.69 | 7982.41 | 3070.16 |
| 866 | | | | | 4 on 1 | 8 | 18 | 10.5 | 5713.91 | 3070.39 | 7889.95 | 3074.12 |
| 867 | | | | | | | 26 | 12.5 | 4946.7 | 2179.85 | 6380.01 | 3075.65 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 868 | | | | | | | 18 | 9 | 4055.55 | 2166.95 | 4795.18 | 2031.4 |
| 869 | | | | 8x10 | 4 on 1 | 14 | 26 | 11 | 3407.64 | 2421.36 | 4111.14 | 2032.9 |
| 870 | | | | | | 20 | 26 | 9.5 | 2330.82 | 1698.54 | 2388.74 | 1282.85 |
| 871 | | | | | | | 10 | 11 | 25541.09 | 19210.39 | 21310.4 | 9625.04 |
| 872 | | | | | | | 18 | 15 | 25683.09 | 19362.46 | 21082.48 | 9642.6 |
| 873 | | | | | 2 on 1 | 8 | 26 | 19 | 26846.97 | 20292.91 | 21622.22 | 10084.11 |
| 874 | | | | | | | 18 | 12 | 16952.03 | 15416.64 | 14284.71 | 6369.65 |
| 875 | | | | | | 14 | 26 | 16 | 17737.73 | 15520.51 | 14677.41 | 6664.96 |
| 876 | | | | | | 20 | 26 | 13 | 10737.3 | 9684.26 | 9168.45 | 4022.46 |
| 877 | | | 3 | 10x12 | | | 10 | 10.5 | 4533.54 | 2494.74 | 7570.33 | 3074.12 |
| 878 | | | | | | 8 | 18 | 12.5 | 4084.92 | 2610.12 | 7582.39 | 3075.65 |
| 879 | | | | | 4 on 1 | | 26 | 14.5 | 3741.85 | 1985.58 | 5909.49 | 3075.39 |
| 880 | | | | | | | 18 | 11 | 2829.95 | 1874.19 | 4707.05 | 2032.9 |
| 881 | | | | | | 14 | 26 | 13 | 2539.54 | 2015.89 | 3784.84 | 2032.69 |
| 882 | 12000 | 0 | | | | 20 | 26 | 11.5 | 1688.59 | 1388.9 | 2281.45 | 1282.65 |
| 883 | | | | | | | 10 | 5 | 60806.34 | 45795.41 | 57185.69 | 23286.27 |
| 884 | | | | | | | 18 | 9 | 61701.95 | 43996.23 | 57528.77 | 23528.85 |
| 885 | | | | | 2 on 1 | 8 | 26 | 13 | 70775.94 | 50197.25 | 63452.84 | 26464.12 |
| 886 | | | | | | | 18 | 6 | 40227.96 | 35411.11 | 38301.61 | 15386.59 |
| 887 | | | | | | 14 | 26 | 10 | 46362.41 | 38565.07 | 42788.08 | 17366.91 |
| 888 | | | 6 | 4x6 | | 20 | 26 | 7 | 25629.89 | 22467.15 | 24787.08 | 9771.43 |
| 889 | | | | | | | 10 | 4.5 | 12365.18 | 6376.21 | 22949.29 | 8356.47 |
| 890 | | | | | | | 18 | 6.5 | 11175.02 | 5561.11 | 24447.86 | 8415.27 |
| 891 | | | | | 4 on 1 | 8 | 26 | 8.5 | 10221.41 | 5297.48 | 19123.9 | 8435.55 |
| 892 | | | | | | | 18 | 5 | 7679.7 | 5031.12 | 14257.95 | 5516.03 |
| 893 | | | | | | 14 | 26 | 7 | 6911.88 | 5621.94 | 11650.52 | 5536.22 |
| 894 | | | | | | 20 | 26 | 5.5 | 4556.18 | 3077.62 | 6828.78 | 3499.4 |
| 895 | | | | | | | 10 | 9 | 64055.35 | 46136.18 | 58023.64 | 23528.85 |
| 896 | | | | 8x10 | 2 on 1 | | 18 | 13 | 72663.05 | 51459.86 | 63948.41 | 26464.12 |
| 897 | | | | | | 8 | 26 | 17 | 73836.84 | 52830.25 | 65148.16 | 27684.15 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 898 | | | | | | | 18 | 10 | 47516.71 | 40231.52 | 43001.7 | 17366.91 |
| 899 | | | | | 2 on 1 | 14 | 26 | 14 | 47697.91 | 40367.98 | 42851 | 17383.47 |
| 900 | | | | | | 20 | 26 | 11 | 30093.89 | 23936.38 | 27701.33 | 10997.83 |
| 901 | | | 6 | 8x10 | | | 10 | 8.5 | 15720.64 | 16087.99 | 26220.25 | 8435.55 |
| 902 | | | | | | 8 | 18 | 10.5 | 13745.56 | 7840.87 | 26783.29 | 8444.32 |
| 903 | | | | | 4 on 1 | | 26 | 12.5 | 12190.63 | 5643.17 | 20431.79 | 8445.46 |
| 904 | | | | | | | 18 | 9 | 9583.13 | 5695.06 | 16256.53 | 5544.65 |
| 905 | | | | | | 14 | 26 | 11 | 8338.72 | 6430.49 | 12833.01 | 5545.67 |
| 906 | | | | | | 20 | 26 | 9.5 | 5590.53 | 4466.79 | 7760.07 | 3508.87 |
| 907 | | | | | | | 10 | 11 | 70377.14 | 52401.35 | 63568.89 | 26435.94 |
| 908 | | | | | | | 18 | 15 | 70674.2 | 52245.29 | 63459.19 | 26474.92 |
| 909 | | 0 | | | 2 on 1 | 8 | 26 | 19 | 73886.33 | 53972.48 | 64919.12 | 27684.03 |
| 910 | | | | | | | 18 | 12 | 46361.22 | 41831.76 | 42634.16 | 17379.82 |
| 911 | | | | | | 14 | 26 | 16 | 48514.15 | 41932.89 | 43817.02 | 18176.32 |
| 912 | | | | | | 20 | 26 | 13 | 29414.35 | 26374.74 | 27571.82 | 10997.53 |
| 913 | 12000 | | | 10x12 | | | 10 | 10.5 | 11415.56 | 6789.16 | 26792.89 | 8444.32 |
| 914 | | | | | | 8 | 18 | 12.5 | 10450.92 | 6973.85 | 27080.08 | 8445.46 |
| 915 | | | | | 4 on 1 | | 26 | 14.5 | 9736.2 | 5302.24 | 19800.84 | 8445.18 |
| 916 | | | | | | | 18 | 11 | 7122.6 | 5142.43 | 16620.94 | 5545.67 |
| 917 | | | | | | 14 | 26 | 13 | 6560.59 | 5577.05 | 12558.86 | 5545.41 |
| 918 | | | | | | 20 | 26 | 11.5 | 4307.82 | 3783.99 | 7738.99 | 3508.61 |
| 919 | | | | | | | 10 | 5 | 29919.3 | 23871.46 | 25632.52 | 11386.27 |
| 920 | | | | | | | 18 | 9 | 30782.26 | 23559.89 | 25698.88 | 11581.12 |
| 921 | | | | | 2 on 1 | 8 | 26 | 13 | 34999.54 | 27944.24 | 28288.19 | 13060.03 |
| 922 | | | | | | | 18 | 6 | 20562.17 | 18721.23 | 17862.01 | 7779.2 |
| 923 | | | | | | 14 | 26 | 10 | 23494.91 | 20748.9 | 19672.17 | 8824.05 |
| 924 | | 3 | 0 | 4x6 | | 20 | 26 | 7 | 13463.88 | 11929.08 | 11735.47 | 5088.01 |
| 925 | | | | | | | 10 | 4.5 | 8576.43 | 4245.02 | 8712.99 | 4103.14 |
| 926 | | | | | 4 on 1 | | 18 | 6.5 | 8070.63 | 4573.6 | 9508.19 | 4140.83 |
| 927 | | | | | | 8 | 26 | 8.5 | 7201.22 | 3764.28 | 8515.5 | 4163.21 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 928 | 12000 | 3 | 0 | 4x6 | 4 on 1 | 14 | 18 | 5 | 5840.83 | 3504.21 | 5790.88 | 2791.49 |
| 929 | | | | | | | 26 | 7 | 5218.31 | 4009.13 | 5567.1 | 2813.89 |
| 930 | | | | | | 20 | 26 | 5.5 | 3663.16 | 2477.82 | 3398.89 | 1822.38 |
| 931 | | | | 8x10 | 2 on 1 | 8 | 10 | 9 | 33256.27 | 25365.48 | 26393.34 | 11581.12 |
| 932 | | | | | | | 18 | 13 | 37478.75 | 29241.76 | 29322 | 13060.03 |
| 933 | | | | | | | 26 | 17 | 36274.39 | 29562.35 | 28870.65 | 13672.79 |
| 934 | | | | | | 14 | 18 | 10 | 25071.95 | 22069.14 | 20163.82 | 8824.05 |
| 935 | | | | | | | 26 | 14 | 25397.02 | 22230.57 | 20279.53 | 8848.44 |
| 936 | | | | | | 20 | 26 | 11 | 16362.17 | 13879.13 | 13298.37 | 5741.3 |
| 937 | | | | | 4 on 1 | 8 | 10 | 8.5 | 12536.73 | 10939.06 | 10797.16 | 4163.21 |
| 938 | | | | | | | 18 | 10.5 | 10942.71 | 6974.29 | 11167.82 | 4170.71 |
| 939 | | | | | | | 26 | 12.5 | 9248.85 | 4620.55 | 9924.5 | 4173.17 |
| 940 | | | | | | 14 | 18 | 9 | 8102.18 | 4685.52 | 7026.24 | 2821.39 |
| 941 | | | | | | | 26 | 11 | 6812.86 | 5000.74 | 6599.95 | 2823.85 |
| 942 | | | | | | 20 | 26 | 9.5 | 4886.82 | 3674.98 | 4106.45 | 1832.34 |
| 943 | | | | 10x12 | 2 on 1 | 8 | 10 | 11 | 34511.16 | 28604.2 | 28110.1 | 13041.2 |
| 944 | | | | | | | 18 | 15 | 34753 | 28770.63 | 27942.07 | 13074.89 |
| 945 | | | | | | | 26 | 19 | 36308.91 | 29426.26 | 28740.85 | 13672.67 |
| 946 | | | | | | 14 | 18 | 12 | 23447.9 | 22497.97 | 19507.12 | 8840.46 |
| 947 | | | | | | | 26 | 16 | 24536.94 | 22342.25 | 19963.24 | 9251.65 |
| 948 | | | | | | 20 | 26 | 13 | 15275.7 | 14297.27 | 12705.99 | 5741.69 |
| 949 | | | | | 4 on 1 | 8 | 10 | 10.5 | 7567.34 | 4159.01 | 9332.45 | 4170.71 |
| 950 | | | | | | | 18 | 12.5 | 6825.5 | 4680.5 | 9494.79 | 4173.17 |
| 951 | | | | | | | 26 | 14.5 | 6092.64 | 3424.25 | 7943.14 | 4172.9 |
| 952 | | | | | | 14 | 18 | 11 | 4940.7 | 3256.79 | 6084.56 | 2823.85 |
| 953 | | | | | | | 26 | 13 | 4375.66 | 3467.07 | 5283.72 | 2823.58 |
| 954 | | | | | | 20 | 26 | 11.5 | 3059.66 | 2489.6 | 3321.52 | 1832.07 |
| 955 | | | 3 | 4x6 | 2 on 1 | 8 | 10 | 5 | 26735.63 | 20097.11 | 23508.91 | 10197.34 |
| 956 | | | | | | | 18 | 9 | 27147.56 | 19261.74 | 23256.1 | 10301.39 |
| 957 | | | | | | | 26 | 13 | 30994.68 | 22573.41 | 25596.76 | 11600.15 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 958 | | | | | | | 18 | 6 | 17787.87 | 15624.81 | 15805.52 | 6773.88 |
| 959 | | | | | 2 on 1 | 14 | 26 | 10 | 20394.37 | 17066.46 | 17281.67 | 7660.68 |
| 960 | | | | 4x6 | | 20 | 26 | 7 | 11273.83 | 9855.33 | 10056.72 | 4299.44 |
| 961 | | | | | | | 10 | 4.5 | 6296.25 | 2894.48 | 8464.74 | 3660.34 |
| 962 | | | | | | | 18 | 6.5 | 5530.32 | 2624.71 | 8699.29 | 3683.73 |
| 963 | | | | | 4 on 1 | 8 | 26 | 8.5 | 4936.51 | 2425.25 | 7142.41 | 3696.08 |
| 964 | | | | | | | 18 | 5 | 3871.78 | 2295.81 | 5217.3 | 2428.87 |
| 965 | | | | | | 14 | 26 | 7 | 3362.39 | 2543.1 | 4486.03 | 2441.11 |
| 966 | | | | | | 20 | 26 | 5.5 | 2258.06 | 1402.55 | 2585.82 | 1538.61 |
| 967 | | | | | | | 10 | 9 | 28630.11 | 20456.58 | 23861.42 | 10301.39 |
| 968 | | | | | | | 18 | 13 | 32114.2 | 23045.3 | 25931.05 | 11600.15 |
| 969 | | | | | 2 on 1 | 8 | 26 | 17 | 32296.38 | 23865.5 | 26330.51 | 12140.1 |
| 970 | | | | | | | 18 | 10 | 21096.54 | 17874.45 | 17604.93 | 7660.68 |
| 971 | | | | | | 14 | 26 | 14 | 21153.67 | 17866.38 | 17264.1 | 7674.06 |
| 972 | | | | | | 20 | 26 | 11 | 13317.02 | 10743.15 | 11209.08 | 4841.37 |
| 973 | 12000 | 3 | 3 | 8x10 | | | 10 | 8.5 | 8135.64 | 7378.16 | 9609.79 | 3696.08 |
| 974 | | | | | | 8 | 18 | 10.5 | 6878.82 | 3696.36 | 9498.48 | 3700.84 |
| 975 | | | | | 4 on 1 | | 26 | 12.5 | 5955.19 | 2624.26 | 7680.71 | 3702.69 |
| 976 | | | | | | | 18 | 9 | 4882.35 | 2608.72 | 5772.78 | 2445.54 |
| 977 | | | | | | 14 | 26 | 11 | 4102.36 | 2915 | 4949.29 | 2447.35 |
| 978 | | | | | | 20 | 26 | 9.5 | 2806.01 | 2044.82 | 2875.74 | 1544.38 |
| 979 | | | | | | | 10 | 11 | 30748.19 | 23126.84 | 25654.98 | 11587.31 |
| 980 | | | | | | | 18 | 15 | 30919.13 | 23309.92 | 25380.59 | 11608.45 |
| 981 | | | | | 2 on 1 | 8 | 26 | 19 | 32320.3 | 24430.06 | 26030.37 | 12139.98 |
| 982 | | | | | | | 18 | 12 | 20408.06 | 18559.65 | 17196.95 | 7668.24 |
| 983 | | | | | | 14 | 26 | 16 | 21353.95 | 18684.7 | 17669.71 | 8023.76 |
| 984 | | | | | | 20 | 26 | 13 | 12926.33 | 11658.6 | 11037.63 | 4842.53 |
| 985 | | | | 10x12 | | | 10 | 10.5 | 5457.79 | 3003.35 | 9113.7 | 3700.84 |
| 986 | | | | | 4 on 1 | 8 | 18 | 12.5 | 4917.71 | 3142.25 | 9128.23 | 3702.69 |
| 987 | | | | | | | 26 | 14.5 | 4504.71 | 2390.38 | 7114.26 | 3702.38 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 988 | | | | | | | 18 | 11 | 3406.9 | 2256.29 | 5666.68 | 2447.35 |
| 989 | | | 3 | 10x12 | 4 on 1 | 14 | 26 | 13 | 3057.28 | 2426.87 | 4556.46 | 2447.09 |
| 990 | | | | | | 20 | 26 | 11.5 | 2032.84 | 1672.06 | 2746.58 | 1544.15 |
| 991 | | | | | | | 10 | 5 | 73203.01 | 55131.77 | 68844.2 | 28033.67 |
| 992 | | | | | | | 18 | 9 | 74281.21 | 52965.8 | 69257.23 | 28325.71 |
| 993 | | | | | 2 on 1 | 8 | 26 | 13 | 85205.12 | 60431.02 | 76389.05 | 31859.39 |
| 994 | | | | | | | 18 | 6 | 48429.29 | 42630.41 | 46110.21 | 18523.47 |
| 995 | | | | | | 14 | 26 | 10 | 55814.37 | 46427.38 | 51511.34 | 20907.52 |
| 996 | | | | 4x6 | | 20 | 26 | 7 | 30855.08 | 27047.55 | 29840.45 | 11763.54 |
| 997 | | | | | | | 10 | 4.5 | 14886.09 | 7676.14 | 27628 | 10060.12 |
| 998 | | | | | | | 18 | 6.5 | 13453.29 | 6694.86 | 29432.08 | 10130.9 |
| 999 | | | | | 4 on 1 | 8 | 26 | 8.5 | 12305.26 | 6377.49 | 20322.71 | 10155.32 |
| 1000 | | | | | | | 18 | 5 | 9245.38 | 6056.82 | 17164.74 | 6640.59 |
| 1001 | | | | | | 14 | 26 | 7 | 8321.01 | 6768.09 | 14025.73 | 6664.9 |
| 1002 | 12000 | 3 | 6 | | | 20 | 26 | 5.5 | 5485.06 | 3705.06 | 8220.97 | 4212.82 |
| 1003 | | | | | | | 10 | 9 | 77114.39 | 55542.03 | 69852.99 | 28325.71 |
| 1004 | | | | | | | 18 | 13 | 87476.95 | 61951.05 | 76985.66 | 31859.39 |
| 1005 | | | | | 2 on 1 | 8 | 26 | 17 | 88890.05 | 63600.82 | 78430 | 33328.16 |
| 1006 | | | | | | | 18 | 10 | 57204.01 | 48433.57 | 51768.52 | 20907.52 |
| 1007 | | | | | | 14 | 26 | 14 | 57422.14 | 48597.85 | 51587.09 | 20927.46 |
| 1008 | | | | | | 20 | 26 | 11 | 36229.16 | 28816.32 | 33348.83 | 13239.97 |
| 1009 | | | | 8x10 | | | 10 | 8.5 | 18925.62 | 19367.87 | 31565.8 | 10155.32 |
| 1010 | | | | | | 8 | 18 | 10.5 | 16547.88 | 9439.4 | 32243.63 | 10165.87 |
| 1011 | | | | | 4 on 1 | | 26 | 12.5 | 14675.95 | 6793.65 | 24597.24 | 10167.25 |
| 1012 | | | | | | | 18 | 9 | 11536.85 | 6856.12 | 19570.77 | 6675.05 |
| 1013 | | | | | | 14 | 26 | 11 | 10038.75 | 7741.48 | 15449.29 | 6676.28 |
| 1014 | | | | | | 20 | 26 | 9.5 | 6730.28 | 5377.44 | 9342.13 | 4224.23 |
| 1015 | | | | | | | 10 | 11 | 84725.02 | 63084.48 | 76528.77 | 31825.47 |
| 1016 | | | | 10x12 | 2 on 1 | | 18 | 15 | 85082.64 | 62869.61 | 76396.7 | 31872.39 |
| 1017 | | | | | | 8 | 26 | 19 | 88949.62 | 64975.91 | 78154.26 | 33328 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1018 | 12000 | 3 | 6 | 10x12 | 2 on 1 | 14 | 18 | 12 | 55812.95 | 50360.06 | 51326.04 | 20923.07 |
| 1019 | | | | | | | 26 | 16 | 58404.8 | 50481.8 | 52750.05 | 21881.95 |
| 1020 | | | | | | 20 | 26 | 13 | 35411.09 | 31751.8 | 33192.93 | 13239.61 |
| 1021 | | | | | 4 on 1 | 8 | 10 | 10.5 | 13742.87 | 8173.28 | 32255.2 | 10165.87 |
| 1022 | | | | | | | 18 | 12.5 | 12581.57 | 8395.62 | 32600.94 | 10167.25 |
| 1023 | | | | | | | 26 | 14.5 | 11721.14 | 6383.22 | 23837.66 | 10166.92 |
| 1024 | | | | | | 14 | 18 | 11 | 8574.69 | 6190.83 | 20009.47 | 6676.28 |
| 1025 | | | | | | | 26 | 13 | 7898.11 | 6714.05 | 15119.25 | 6675.96 |
| 1026 | | | | | | 20 | 26 | 11.5 | 5186.06 | 4555.43 | 9316.74 | 4223.92 |

# APPENDIX V – FREEWAY ACCIDENT COST COMPILATION

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | 10 | 5 | 38409.57 | 33274.62 | 33302.77 | 14772.25 |
| 2 | | | | | | | 18 | 9 | 40085.92 | 34328.67 | 34553.28 | 15333.12 |
| 3 | | | | | | 8 | 26 | 13 | 46222.43 | 39458.41 | 39808.43 | 17666.65 |
| 4 | | | | | 2 on 1 | | 18 | 5 | 27586.84 | 25931.34 | 24649.78 | 10569.35 |
| 5 | | | | | | 16 | 26 | 9 | 28699.52 | 26207.13 | 25272.75 | 11041.78 |
| 6 | | | | | | 24 | 26 | 5 | 20990.17 | 20453.58 | 18701.98 | 8042.73 |
| 7 | | | | | | | 10 | 4.5 | 11939.29 | 8245.60 | 8485.41 | 5347.72 |
| 8 | | | | | | | 18 | 6.5 | 11530.26 | 9193.23 | 9441.33 | 5482.02 |
| 9 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 10622.04 | 8424.74 | 9848.85 | 5589.11 |
| 10 | | | | | | 16 | 18 | 4.5 | 8783.51 | 7032.03 | 6009.58 | 3831.27 |
| 11 | | | | | | | 26 | 6.5 | 8215.98 | 6800.73 | 6720.71 | 3938.38 |
| 12 | | | | | | 24 | 26 | 4.5 | 6135.44 | 4931.53 | 4557.67 | 2765.32 |
| 13 | | | | | | | 10 | 4.33 | 9367.66 | 6021.82 | 6143.59 | 1349.87 |
| 14 | | | | | | | 18 | 5.66 | 8191.46 | 6253.93 | 6768.65 | 1376.14 |
| 15 | 5000 | 0 | 0 | | 6 on 1 | 8 | 26 | 7 | 6990.06 | 4969.78 | 7092.15 | 1395.86 |
| 16 | | | | | | | 18 | 4.33 | 7005.03 | 5251.66 | 4341.89 | 970.37 |
| 17 | | | | | | 16 | 26 | 5.66 | 7662.73 | 5213.12 | 6272.20 | 1251.36 |
| 18 | | | | | | 24 | 26 | 4.33 | 5284.02 | 3787.40 | 3270.11 | 740.08 |
| 19 | | | | | | | 10 | 9 | 43193.43 | 37366.69 | 35512.63 | 15333.12 |
| 20 | | | | | | | 18 | 13 | 49368.23 | 41549.13 | 41154.18 | 17666.65 |
| 21 | | | | | | 8 | 26 | 17 | 48429.31 | 42938.27 | 41763.61 | 18700.41 |
| 22 | | | | 8x10 | 2 on 1 | | 18 | 9 | 30987.57 | 29352.65 | 25924.13 | 11041.78 |
| 23 | | | | | | 16 | 26 | 13 | 35345.93 | 33844.93 | 30210.50 | 12655.60 |
| 24 | | | | | | 24 | 26 | 9 | 23485.29 | 22073.28 | 19833.38 | 8396.36 |
| 25 | | | | | | | 10 | 8.5 | 18397.10 | 10274.93 | 11691.62 | 5589.11 |
| 26 | | | | | 4 on 1 | | 18 | 10.5 | 14155.16 | 11842.66 | 12699.35 | 5669.21 |
| 27 | | | | | | 8 | 26 | 12.5 | 15363.45 | 13174.90 | 13254.41 | 5709.43 |
| 28 | | | | | | 16 | 18 | 8.5 | 13334.74 | 11433.69 | 8471.50 | 4018.48 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | | | | | 4 on 1 | 16 | 26 | 10.5 | 12326.49 | 9826.95 | 9372.17 | 4058.71 |
| 30 | | | | | | 24 | 26 | 8.5 | 10091.10 | 8591.22 | 6451.19 | 3043.86 |
| 31 | | | | 8x10 | 6 on 1 | | 10 | 8.33 | 15636.67 | 9751.35 | 9743.10 | 1405.84 |
| 32 | | | | | | | 18 | 9.66 | 13540.26 | 9483.68 | 10233.43 | 1409.68 |
| 33 | | | | | | 8 | 26 | 11 | 11314.00 | 7988.40 | 10224.19 | 1409.25 |
| 34 | | | | | | | 18 | 8.33 | 11831.55 | 9234.11 | 7072.93 | 1003.91 |
| 35 | | | | | | 16 | 26 | 9.66 | 9949.79 | 6975.06 | 7473.56 | 1003.48 |
| 36 | | | | | | 24 | 26 | 8.33 | 8766.54 | 6620.85 | 5146.25 | 753.46 |
| 37 | | | | | 2 on 1 | | 10 | 11 | 45121.88 | 41053.64 | 38847.48 | 17450.15 |
| 38 | | | | | | | 18 | 15 | 46164.42 | 41623.32 | 44341.42 | 19910.90 |
| 39 | | | | | | 8 | 26 | 19 | 48940.05 | 43063.88 | 42012.58 | 18737.91 |
| 40 | 5000 | 0 | 0 | | | | 18 | 11 | 32410.51 | 32269.31 | 28530.08 | 12546.07 |
| 41 | | | | | | 16 | 26 | 15 | 33282.24 | 33951.77 | 29126.64 | 12736.48 |
| 42 | | | | | | 24 | 26 | 11 | 24791.11 | 24783.17 | 21664.23 | 9499.47 |
| 43 | | | | | 4 on 1 | | 10 | 10.5 | 11272.41 | 8563.14 | 9210.71 | 5669.21 |
| 44 | | | | | | | 18 | 12.5 | 10706.07 | 8915.76 | 9633.14 | 5709.43 |
| 45 | | | | | | 8 | 26 | 14.5 | 9981.49 | 8454.04 | 9746.92 | 5724.80 |
| 46 | | | | 10x12 | | | 18 | 10.5 | 8304.68 | 7327.02 | 6657.77 | 4058.71 |
| 47 | | | | | | 16 | 26 | 12.5 | 7788.73 | 6543.33 | 6926.13 | 4074.07 |
| 48 | | | | | | 24 | 26 | 10.5 | 6279.38 | 5465.93 | 4976.08 | 3059.22 |
| 49 | | | | | 6 on 1 | | 10 | 10.33 | 8313.58 | 5150.17 | 6685.94 | 1409.25 |
| 50 | | | | | | | 18 | 11.66 | 6558.62 | 5002.30 | 6818.51 | 1409.25 |
| 51 | | | | | | 8 | 26 | 13 | 6090.32 | 4087.11 | 6727.09 | 1409.25 |
| 52 | | | | | | | 18 | 10.33 | 6225.07 | 4759.27 | 4807.80 | 1003.48 |
| 53 | | | | | | 16 | 26 | 11.66 | 5249.47 | 3600.62 | 4875.41 | 1003.48 |
| 54 | | | | | | 24 | 26 | 10.33 | 4550.39 | 3385.76 | 3361.58 | 753.46 |
| 55 | | | | | | | 10 | 5 | 29989.79 | 25610.43 | 25788.22 | 11517.42 |
| 56 | | | 2 | 4x6 | 2 on 1 | | 18 | 9 | 30823.79 | 25542.03 | 26263.15 | 11846.21 |
| 57 | | | | | | 8 | 26 | 13 | 35552.57 | 29234.99 | 29976.49 | 13564.71 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 58 | | | | | | | 18 | 5 | 21291.87 | 19989.48 | 18582.97 | 8175.34 |
| 59 | | | | | 2 on 1 | 16 | 26 | 9 | 21892.42 | 20158.64 | 18724.45 | 8432.97 |
| 60 | | | | | | 24 | 26 | 5 | 16052.26 | 15743.32 | 14223.14 | 6178.19 |
| 61 | | | | | | | 10 | 4.5 | 7828.62 | 5508.59 | 5763.99 | 4158.60 |
| 62 | | | | | | | 18 | 6.5 | 7481.40 | 6059.02 | 6237.18 | 4236.35 |
| 63 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 6997.48 | 5783.40 | 6453.34 | 4298.20 |
| 64 | | | | | | 16 | 18 | 4.5 | 5668.25 | 4655.49 | 4027.92 | 2954.07 |
| 65 | | | | | | | 26 | 6.5 | 5254.08 | 4393.62 | 4220.60 | 3015.93 |
| 66 | | | | | | 24 | 26 | 4.5 | 3819.80 | 3285.83 | 3123.91 | 2235.37 |
| 67 | | | | | | | 10 | 4.33 | 5656.47 | 3362.46 | 3948.02 | 1043.30 |
| 68 | | | | | | | 18 | 5.66 | 4879.45 | 3379.78 | 3964.49 | 1058.47 |
| 69 | | | | | | 8 | 26 | 7 | 4082.14 | 2902.02 | 4219.19 | 1069.87 |
| 70 | 5000 | 0 | 2 | | 6 on 1 | | 18 | 4.33 | 4121.33 | 3095.48 | 2538.08 | 742.84 |
| 71 | | | | | | 16 | 26 | 5.66 | 4354.17 | 3092.39 | 3358.62 | 953.30 |
| 72 | | | | | | 24 | 26 | 4.33 | 2961.28 | 2219.93 | 1853.32 | 561.56 |
| 73 | | | | | | | 10 | 9 | 32417.38 | 27764.48 | 26795.63 | 11846.21 |
| 74 | | | | | | | 18 | 13 | 37067.44 | 30591.56 | 30433.51 | 13564.71 |
| 75 | | | | | | 8 | 26 | 17 | 37245.34 | 31593.46 | 31142.19 | 14325.79 |
| 76 | | | | | 2 on 1 | | 18 | 9 | 23061.98 | 21734.95 | 19178.79 | 8432.97 |
| 77 | | | | | | 16 | 26 | 13 | 26338.74 | 25451.05 | 22042.04 | 9641.14 |
| 78 | | | | | | 24 | 26 | 9 | 17386.66 | 16432.36 | 14659.36 | 6374.22 |
| 79 | | | | | | | 10 | 8.5 | 11523.50 | 6582.27 | 7472.87 | 4298.20 |
| 80 | | | | | | | 18 | 10.5 | 8919.70 | 7547.84 | 7761.23 | 4344.44 |
| 81 | | | | | | 8 | 26 | 12.5 | 9656.09 | 7986.20 | 7999.33 | 4374.10 |
| 82 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 8222.28 | 6903.29 | 5250.82 | 3062.18 |
| 83 | | | | | | 16 | 26 | 10.5 | 7491.02 | 5922.13 | 5408.65 | 3091.83 |
| 84 | | | | | | 24 | 26 | 8.5 | 6009.56 | 4937.70 | 3818.65 | 2309.10 |
| 85 | | | | | | | 10 | 8.33 | 9187.73 | 5229.97 | 5580.59 | 1077.20 |
| 86 | | | | | 6 on 1 | | 18 | 9.66 | 7702.39 | 5099.40 | 29874.05 | 1079.92 |
| 87 | | | | | | 8 | 26 | 11 | 6345.49 | 4189.97 | 33577.75 | 1079.59 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 88 | | | | | | | 18 | 8.33 | 6628.28 | 4888.91 | 31501.46 | 764.32 |
| 89 | | | | 8x10 | 6 on 1 | 16 | 26 | 9.66 | 5431.20 | 3633.07 | 3676.77 | 763.99 |
| 90 | | | | | | 24 | 26 | 8.33 | 4702.82 | 3455.78 | 2552.15 | 571.28 |
| 91 | | | | | | | 10 | 11 | 35135.57 | 31242.57 | 29874.05 | 13436.38 |
| 92 | | | | | | | 18 | 15 | 35653.08 | 30569.99 | 33577.75 | 15264.58 |
| 93 | | | | | | 8 | 26 | 19 | 37659.77 | 31670.31 | 31501.43 | 14351.25 |
| 94 | | | | | 2 on 1 | | 18 | 11 | 24945.62 | 24302.00 | 21335.36 | 9569.27 |
| 95 | | | | | | 16 | 26 | 15 | 25405.27 | 25289.46 | 21561.09 | 9697.90 |
| 96 | | | | | | 24 | 26 | 11 | 18873.75 | 18530.21 | 16549.53 | 7216.54 |
| 97 | | | | | | | 10 | 10.5 | 7493.48 | 5496.63 | 6315.86 | 4344.44 |
| 98 | | | | | | | 18 | 12.5 | 7113.39 | 5799.26 | 6305.81 | 4374.10 |
| 99 | | | | | | 8 | 26 | 14.5 | 6565.49 | 5243.39 | 6320.33 | 4384.72 |
| 100 | 5000 | 0 | 2 | 10x12 | 4 on 1 | | 18 | 10.5 | 5409.94 | 4661.50 | 4314.91 | 3091.83 |
| 101 | | | | | | 16 | 26 | 12.5 | 4957.47 | 4177.21 | 4314.00 | 3102.45 |
| 102 | | | | | | 24 | 26 | 10.5 | 3900.47 | 3418.65 | 3109.26 | 2319.72 |
| 103 | | | | | | | 10 | 10.33 | 4935.53 | 2859.49 | 4039.55 | 1079.59 |
| 104 | | | | | | | 18 | 11.66 | 3961.18 | 2787.24 | 3930.53 | 1079.59 |
| 105 | | | | | | 8 | 26 | 13 | 3530.39 | 2300.96 | 3923.37 | 1079.59 |
| 106 | | | | | 6 on 1 | | 18 | 10.33 | 3580.25 | 2634.99 | 2711.36 | 763.99 |
| 107 | | | | | | 16 | 26 | 11.66 | 2934.92 | 1989.89 | 2657.22 | 763.99 |
| 108 | | | | | | 24 | 26 | 10.33 | 2485.87 | 1854.79 | 1859.39 | 571.28 |
| 109 | | | | | | | 10 | 5 | 65774.66 | 55620.05 | 56392.71 | 25231.97 |
| 110 | | | | | | | 18 | 9 | 67194.69 | 52731.89 | 56876.02 | 25796.02 |
| 111 | | | | | | 8 | 26 | 13 | 77350.58 | 61473.39 | 65588.32 | 29472.25 |
| 112 | | | 4 | 4x6 | 2 on 1 | | 18 | 5 | 44828.68 | 41912.73 | 40040.64 | 17188.60 |
| 113 | | | | | | 16 | 26 | 9 | 45652.77 | 42575.62 | 40143.17 | 17686.07 |
| 114 | | | | | | 24 | 26 | 5 | 32950.70 | 32400.03 | 30062.90 | 12699.67 |
| 115 | | | | | | | 10 | 4.5 | 15432.03 | 10002.68 | 11525.86 | 9109.13 |
| 116 | | | | | 4 on 1 | | 18 | 6.5 | 13579.70 | 10991.76 | 11552.83 | 9222.43 |
| 117 | | | | | | 8 | 26 | 8.5 | 12899.13 | 10506.77 | 11669.46 | 9352.93 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 118 | | | | | | 16 | 18 | 4.5 | 9854.13 | 8254.99 | 7649.55 | 6195.14 |
| 119 | | | | | 4 on 1 | | 26 | 6.5 | 9364.60 | 7759.80 | 7856.39 | 6318.71 |
| 120 | | | | | | 24 | 26 | 4.5 | 7153.37 | 6100.14 | 6364.33 | 4848.85 |
| 121 | | | | 4x6 | | | 10 | 4.33 | 9800.20 | 4920.48 | 6445.76 | 2273.23 |
| 122 | | | | | | | 18 | 5.66 | 7349.83 | 4943.77 | 6443.36 | 2304.84 |
| 123 | | | | | | 8 | 26 | 7 | 6383.41 | 4308.73 | 6481.06 | 2327.19 |
| 124 | | | | | 6 on 1 | | 18 | 4.33 | 6057.49 | 4525.78 | 4171.76 | 1558.13 |
| 125 | | | | | | 16 | 26 | 5.66 | 6632.10 | 4623.64 | 5389.27 | 1996.51 |
| 126 | | | | | | 24 | 26 | 4.33 | 4468.20 | 3337.21 | 2941.36 | 1154.33 |
| 127 | | | | | | | 10 | 9 | 70055.89 | 58227.89 | 57427.18 | 25796.02 |
| 128 | | | | | | | 18 | 13 | 79471.07 | 63842.30 | 65506.06 | 29472.25 |
| 129 | | | | | | 8 | 26 | 17 | 81409.73 | 66596.77 | 68201.94 | 31107.71 |
| 130 | | | | | 2 on 1 | | 18 | 9 | 47296.81 | 44173.66 | 40363.11 | 17686.07 |
| 131 | | | | | | 16 | 26 | 13 | 54063.40 | 52216.46 | 46150.62 | 20168.30 |
| 132 | 5000 | 0 | 4 | | | 24 | 26 | 9 | 34874.29 | 33045.54 | 30545.62 | 13096.46 |
| 133 | | | | | | | 10 | 8.5 | 20606.69 | 11229.29 | 12821.60 | 9352.93 |
| 134 | | | | | | | 18 | 10.5 | 15857.67 | 13664.38 | 12779.06 | 9440.63 |
| 135 | | | | | | 8 | 26 | 12.5 | 16717.97 | 14370.91 | 13040.97 | 9497.98 |
| 136 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 13224.27 | 11205.96 | 8738.53 | 6403.41 |
| 137 | | | | | | 16 | 26 | 10.5 | 12575.93 | 10479.28 | 9060.61 | 6460.72 |
| 138 | | | | | | 24 | 26 | 8.5 | 9973.32 | 8404.87 | 6683.83 | 4738.50 |
| 139 | | | | | | | 10 | 8.33 | 16812.72 | 9054.26 | 8963.92 | 2584.56 |
| 140 | | | | | | | 18 | 9.66 | 13063.30 | 8950.66 | 8756.50 | 2591.82 |
| 141 | | | | | | 8 | 26 | 11 | 11170.58 | 7505.94 | 8828.22 | 2591.00 |
| 142 | | | | | 6 on 1 | | 18 | 8.33 | 11030.50 | 8315.55 | 6110.50 | 1766.67 |
| 143 | | | | | | 16 | 26 | 9.66 | 9354.17 | 6447.05 | 6257.65 | 1765.84 |
| 144 | | | | | | 24 | 26 | 8.33 | 8048.98 | 6070.34 | 4512.82 | 1294.91 |
| 145 | | | | | | | 10 | 11 | 84653.59 | 73837.66 | 71633.85 | 32210.95 |
| 146 | | | | 10x12 | 2 on 1 | | 18 | 15 | 85427.88 | 71715.84 | 92653.69 | 42268.92 |
| 147 | | | | | | 8 | 26 | 19 | 90423.45 | 73514.15 | 75436.61 | 34417.70 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 148 | | | | | | | 18 | 11 | 57607.29 | 55688.69 | 50176.40 | 22100.62 |
| 149 | | | | | 2 on 1 | 16 | 26 | 15 | 58752.82 | 57902.39 | 50977.33 | 22377.71 |
| 150 | | | | | | 24 | 26 | 11 | 42835.90 | 41317.99 | 38273.91 | 16364.88 |
| 151 | | | | | | | 10 | 10.5 | 15790.63 | 11531.73 | 13164.60 | 10420.66 |
| 152 | | | | | | | 18 | 12.5 | 14695.85 | 12373.82 | 13385.21 | 10483.97 |
| 153 | | | | | | 8 | 26 | 14.5 | 14077.68 | 11645.22 | 13410.83 | 10513.58 |
| 154 | | 0 | 4 | 10x12 | 4 on 1 | | 18 | 10.5 | 10726.20 | 9472.36 | 9169.42 | 7131.41 |
| 155 | | | | | | 16 | 26 | 12.5 | 10242.23 | 8878.98 | 9242.23 | 7161.12 |
| 156 | | | | | | 24 | 26 | 10.5 | 7190.39 | 6340.54 | 6053.83 | 4761.78 |
| 157 | | | | | | | 10 | 10.33 | 8793.39 | 4973.25 | 7050.75 | 2347.32 |
| 158 | | | | | | | 18 | 11.66 | 6413.87 | 4910.43 | 6955.28 | 2347.32 |
| 159 | | | | | | 8 | 26 | 13 | 6271.75 | 4113.05 | 6997.13 | 2347.32 |
| 160 | | | | | 6 on 1 | | 18 | 10.33 | 5786.67 | 4492.81 | 4843.30 | 1599.77 |
| 161 | | | | | | 16 | 26 | 11.66 | 5077.55 | 3467.09 | 4896.76 | 1599.77 |
| 162 | 5000 | | | | | 24 | 26 | 10.33 | 4240.97 | 3165.43 | 3448.92 | 1173.13 |
| 163 | | | | | | | 10 | 5 | 42396.87 | 36383.86 | 36759.93 | 16305.76 |
| 164 | | | | | | | 18 | 9 | 44247.24 | 37892.34 | 38140.25 | 16924.86 |
| 165 | | | | | | 8 | 26 | 13 | 51020.78 | 43554.59 | 43940.95 | 19500.63 |
| 166 | | | | | 2 on 1 | | 18 | 5 | 30450.63 | 28557.30 | 27208.68 | 11666.56 |
| 167 | | | | | | 16 | 26 | 9 | 31678.82 | 28830.25 | 27896.32 | 12188.03 |
| 168 | | | | | | 24 | 26 | 5 | 23169.16 | 22576.87 | 20643.43 | 8877.65 |
| 169 | | | | | | | 10 | 4.5 | 13178.71 | 9101.58 | 9366.28 | 5902.86 |
| 170 | | | | | | | 18 | 6.5 | 12727.21 | 10019.70 | 10421.43 | 6051.11 |
| 171 | | 3 | 0 | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 11724.72 | 9299.31 | 10871.26 | 6169.32 |
| 172 | | | | | | 16 | 18 | 4.5 | 9698.33 | 7762.03 | 6633.43 | 4228.99 |
| 173 | | | | | | | 26 | 6.5 | 9068.89 | 7111.75 | 7418.39 | 4347.23 |
| 174 | | | | | | 24 | 26 | 4.5 | 6772.35 | 5443.48 | 5030.81 | 3052.38 |
| 175 | | | | | | | 10 | 4.33 | 10340.12 | 6308.83 | 6781.36 | 1490.00 |
| 176 | | | | | 6 on 1 | | 18 | 5.66 | 9041.81 | 6403.85 | 7471.30 | 1518.99 |
| 177 | | | | | | 8 | 26 | 7 | 7715.70 | 5485.69 | 7828.39 | 1540.76 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 178 | 5000 | 3 | 0 | 4x6 | 6 on 1 | | 18 | 4.33 | 7732.22 | 5796.83 | 4792.62 | 1071.10 |
| 179 | | | | | | 16 | 26 | 5.66 | 8458.20 | 5754.30 | 6923.32 | 1381.26 |
| 180 | | | | | | 24 | 26 | 4.33 | 5832.55 | 4180.57 | 3609.58 | 816.90 |
| 181 | | | | 8x10 | 2 on 1 | | 10 | 9 | 47677.34 | 40779.57 | 39199.20 | 16924.86 |
| 182 | | | | | | | 18 | 13 | 54493.14 | 45862.35 | 45426.39 | 19500.63 |
| 183 | | | | | | 8 | 26 | 17 | 53456.76 | 47710.96 | 28615.32 | 20641.70 |
| 184 | | | | | | | 18 | 9 | 34204.39 | 32133.92 | 28615.32 | 12188.03 |
| 185 | | | | | | 16 | 26 | 13 | 39015.19 | 37358.37 | 33346.66 | 13969.38 |
| 186 | | | | | | 24 | 26 | 9 | 25923.30 | 24364.71 | 21892.28 | 9267.98 |
| 187 | | | | | 4 on 1 | | 10 | 8.5 | 20306.90 | 11341.57 | 12905.33 | 6169.32 |
| 188 | | | | | | | 18 | 10.5 | 15624.61 | 13072.04 | 14071.67 | 6257.73 |
| 189 | | | | | | 8 | 26 | 12.5 | 16958.33 | 14542.59 | 14630.35 | 6302.13 |
| 190 | | | | | | | 18 | 8.5 | 14719.02 | 12620.62 | 9350.92 | 4435.64 |
| 191 | | | | | | 16 | 26 | 10.5 | 13606.10 | 10847.09 | 10345.10 | 4480.04 |
| 192 | | | | | | 24 | 26 | 8.5 | 11138.66 | 9349.41 | 7120.88 | 3359.84 |
| 193 | | | | | 6 on 1 | | 10 | 8.33 | 17259.92 | 10763.64 | 10754.53 | 1551.78 |
| 194 | | | | | | | 18 | 9.66 | 14945.88 | 10468.18 | 11295.76 | 1556.02 |
| 195 | | | | | | 8 | 26 | 11 | 12488.51 | 8817.68 | 11285.57 | 1555.54 |
| 196 | | | | | | | 18 | 8.33 | 13059.78 | 10192.71 | 7807.17 | 1108.13 |
| 197 | | | | | | 16 | 26 | 9.66 | 10982.67 | 7699.14 | 8249.39 | 1107.65 |
| 198 | | | | | | 24 | 26 | 8.33 | 9676.60 | 7308.16 | 5680.48 | 831.68 |
| 199 | | | | 10x12 | 2 on 1 | | 10 | 11 | 49805.99 | 45315.43 | 42880.24 | 19261.65 |
| 200 | | | | | | | 18 | 15 | 50956.75 | 45944.24 | 56514.57 | 25377.08 |
| 201 | | | | | | 8 | 26 | 19 | 54020.52 | 47534.34 | 43373.91 | 20683.10 |
| 202 | | | | | | | 18 | 11 | 35775.04 | 35619.19 | 31491.79 | 13848.48 |
| 203 | | | | | | 16 | 26 | 15 | 36737.27 | 37213.99 | 32150.28 | 14058.65 |
| 204 | | | | | | 24 | 26 | 11 | 27364.68 | 27355.91 | 23913.19 | 10485.61 |
| 205 | | | | | 4 on 1 | | 10 | 10.5 | 12442.60 | 9452.08 | 10166.88 | 6257.73 |
| 206 | | | | | | | 18 | 12.5 | 11817.47 | 9841.30 | 10633.15 | 6302.13 |
| 207 | | | | | | 8 | 26 | 14.5 | 11017.67 | 8904.96 | 10758.75 | 6319.09 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 208 | | | | | | | 18 | 10.5 | 9166.79 | 8087.64 | 7348.91 | 4480.04 |
| 209 | | | | | 4 on 1 | 16 | 26 | 12.5 | 8597.28 | 7229.20 | 7645.13 | 4497.00 |
| 210 | | | | | | 24 | 26 | 10.5 | 6931.25 | 6143.79 | 5492.65 | 3376.80 |
| 211 | | | 0 | 10x12 | | | 10 | 10.33 | 9176.61 | 5684.81 | 7380.01 | 1555.54 |
| 212 | | | | | | | 18 | 11.66 | 7239.47 | 5521.59 | 7526.34 | 1555.54 |
| 213 | | | | | | 8 | 26 | 13 | 6722.56 | 4511.40 | 7425.43 | 1555.54 |
| 214 | | | | | 6 on 1 | | 18 | 10.33 | 6871.30 | 5253.33 | 5306.89 | 1107.65 |
| 215 | | | | | | 16 | 26 | 11.66 | 5794.42 | 3974.40 | 5381.52 | 1107.65 |
| 216 | | | | | | 24 | 26 | 10.33 | 5022.76 | 3736.60 | 3710.55 | 831.68 |
| 217 | | | | | | | 10 | 5 | 33103.04 | 28269.05 | 28465.30 | 12712.04 |
| 218 | | | | | | | 18 | 9 | 34023.60 | 28193.55 | 28989.53 | 13075.97 |
| 219 | | | | | | 8 | 26 | 13 | 39243.29 | 32269.88 | 33088.35 | 14972.86 |
| 220 | | | | | 2 on 1 | | 18 | 5 | 23502.18 | 22064.59 | 20512.07 | 9024.03 |
| 221 | 5000 | 3 | | | | 16 | 26 | 9 | 24165.07 | 22251.31 | 20668.06 | 9308.40 |
| 222 | | | | | | 24 | 26 | 5 | 17718.65 | 17377.64 | 15699.64 | 6819.55 |
| 223 | | | | | | | 10 | 4.5 | 8641.31 | 6080.43 | 6362.35 | 4590.30 |
| 224 | | | | | | | 18 | 6.5 | 8258.05 | 6688.01 | 6884.66 | 4676.12 |
| 225 | | | 2 | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 7723.56 | 6383.77 | 7123.27 | 4744.40 |
| 226 | | | | | | 16 | 18 | 4.5 | 6256.67 | 5138.78 | 4446.06 | 3260.73 |
| 227 | | | | | | | 26 | 6.5 | 5799.50 | 4849.73 | 4658.74 | 3329.02 |
| 228 | | | | | | 24 | 26 | 4.5 | 4216.33 | 3626.93 | 3448.21 | 2467.42 |
| 229 | | | | | | | 10 | 4.33 | 6243.67 | 3711.52 | 4357.87 | 1151.60 |
| 230 | | | | | | | 18 | 5.66 | 5385.98 | 3730.63 | 4376.04 | 1168.35 |
| 231 | | | | | | 8 | 26 | 7 | 4505.91 | 3203.27 | 4657.18 | 1180.94 |
| 232 | | | | | 6 on 1 | | 18 | 4.33 | 4549.17 | 3416.82 | 2801.56 | 819.99 |
| 233 | | | | | | 16 | 26 | 5.66 | 4806.18 | 3431.41 | 3707.27 | 1052.26 |
| 234 | | | | | | 24 | 26 | 4.33 | 3268.70 | 2450.38 | 2045.71 | 619.86 |
| 235 | | | | | | | 10 | 9 | 35782.63 | 30646.72 | 29577.29 | 13075.97 |
| 236 | | | | 8x10 | 2 on 1 | | 18 | 13 | 40915.41 | 33767.28 | 33592.81 | 14972.86 |
| 237 | | | | | | 8 | 26 | 17 | 41111.79 | 34873.18 | 34375.06 | 15812.95 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **238** | | | | | | | **18** | 9 | 25456.05 | 23991.26 | 21169.74 | 9308.40 |
| **239** | | | | | **2 on 1** | **16** | **26** | 13 | 29072.96 | 28093.12 | 24330.23 | 10641.99 |
| **240** | | | | | | **24** | **26** | 9 | 19191.57 | 18138.20 | 16181.15 | 7035.93 |
| **241** | | | | | | | **10** | 8.5 | 12719.75 | 7265.57 | 8248.63 | 4744.40 |
| **242** | | | | | | | **18** | 10.5 | 9845.65 | 8331.39 | 8566.92 | 4795.44 |
| **243** | | | | | | **8** | **26** | 12.5 | 10658.49 | 8815.24 | 8829.74 | 4828.17 |
| **244** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 9075.84 | 7619.92 | 5795.91 | 3380.06 |
| **245** | | | | | | **16** | **26** | 10.5 | 8268.66 | 6536.90 | 5970.12 | 3412.79 |
| **246** | | | | | | **24** | **26** | 8.5 | 6633.42 | 5450.28 | 4215.06 | 2548.81 |
| **247** | | | | | | | **10** | 8.33 | 10138.20 | 5772.89 | 6159.91 | 1189.03 |
| **248** | | | | | | | **18** | 9.66 | 8501.97 | 5628.77 | 5941.87 | 1192.02 |
| **249** | | | | | | **8** | **26** | 11 | 7004.22 | 4624.94 | 6016.34 | 1191.67 |
| **250** | **5000** | **3** | **2** | | **6 on 1** | | **18** | 8.33 | 7316.37 | 5396.42 | 4108.84 | 843.66 |
| **251** | | | | | | **16** | **26** | 9.66 | 5995.02 | 4010.22 | 4058.46 | 843.30 |
| **252** | | | | | | **24** | **26** | 8.33 | 5191.02 | 3814.52 | 2817.09 | 630.59 |
| **253** | | | | | | | **10** | 11 | 38793.00 | 34485.86 | 32975.27 | 14831.21 |
| **254** | | | | | | | **18** | 15 | 39354.23 | 33743.46 | 42795.92 | 19455.20 |
| **255** | | | | | | **8** | **26** | 19 | 41569.23 | 34958.01 | 34771.62 | 15841.06 |
| **256** | | | | | **2 on 1** | | **18** | 11 | 27535.22 | 26824.79 | 23550.19 | 10562.66 |
| **257** | | | | | | **16** | **26** | 15 | 28042.60 | 27914.76 | 23779.35 | 10704.64 |
| **258** | | | | | | **24** | **26** | 11 | 20833.03 | 20453.83 | 18267.54 | 7965.68 |
| **259** | | | | | | | **10** | 10.5 | 8271.38 | 6067.24 | 6971.51 | 4795.44 |
| **260** | | | | | | | **18** | 12.5 | 7851.84 | 6401.28 | 6960.41 | 4828.17 |
| **261** | | | | | | **8** | **26** | 14.5 | 7247.05 | 5787.71 | 6976.44 | 4839.89 |
| **262** | | | | **10x12** | **4 on 1** | | **18** | 10.5 | 5971.54 | 5145.41 | 4762.84 | 3412.79 |
| **263** | | | | | | **16** | **26** | 12.5 | 5472.41 | 4610.85 | 4761.83 | 3424.51 |
| **264** | | | | | | **24** | **26** | 10.5 | 4305.38 | 3773.54 | 3432.04 | 2560.53 |
| **265** | | | | | | | **10** | 10.33 | 5447.89 | 3156.34 | 4458.90 | 1191.67 |
| **266** | | | | | **6 on 1** | | **18** | 11.66 | 4372.39 | 3076.58 | 4338.56 | 1191.67 |
| **267** | | | | | | **8** | **26** | 13 | 3896.88 | 2539.82 | 4330.65 | 1191.67 |

| Scen. No. | ADT | TGF | **Curvature** | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 268 | | | | | | | 18 | 10.33 | 3951.91 | 2908.22 | 2992.82 | 843.30 |
| 269 | | | 2 | 10x12 | 6 on 1 | 16 | 26 | 11.66 | 3239.60 | 2196.46 | 2933.07 | 843.30 |
| 270 | | | | | | 24 | 26 | 10.33 | 2743.93 | 2047.33 | 2052.42 | 630.59 |
| 271 | | | | | | | 10 | 5 | 72602.72 | 61393.97 | 62246.84 | 27851.30 |
| 272 | | | | | | | 18 | 9 | 74170.16 | 58205.99 | 62780.32 | 28473.90 |
| 273 | | | | | | 8 | 26 | 13 | 85380.34 | 67854.94 | 72397.05 | 32531.77 |
| 274 | | | | | 2 on 1 | | 18 | 5 | 49482.34 | 46263.69 | 44197.26 | 18972.95 |
| 275 | | | | | | 16 | 26 | 9 | 50391.98 | 46695.40 | 44310.43 | 19522.06 |
| 276 | | | | | | 24 | 26 | 5 | 36391.31 | 35763.48 | 33183.73 | 14018.02 |
| 277 | | | | | | | 10 | 4.5 | 17034.03 | 11041.06 | 12722.35 | 10054.75 |
| 278 | | | | | | | 18 | 6.5 | 14989.41 | 12132.81 | 12752.13 | 10179.81 |
| 279 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 14238.19 | 11597.48 | 12880.87 | 10323.85 |
| 280 | | | | | | 16 | 18 | 4.5 | 10877.09 | 9360.88 | 8443.65 | 6838.26 |
| 281 | | | | | | | 26 | 6.5 | 10336.74 | 8565.34 | 7025.71 | 6974.66 |
| 282 | 5000 | 3 | 4 | | | 24 | 26 | 4.5 | 7898.96 | 6733.39 | 7025.01 | 5352.21 |
| 283 | | | | | | | 10 | 4.33 | 10817.56 | 5431.27 | 7114.89 | 2509.21 |
| 284 | | | | | | | 18 | 5.66 | 8112.82 | 5456.98 | 7112.25 | 2544.10 |
| 285 | | | | | | 8 | 26 | 7 | 7046.07 | 4756.02 | 7153.85 | 2568.77 |
| 286 | | | | | 6 on 1 | | 18 | 4.33 | 6686.32 | 4995.60 | 4604.83 | 1719.88 |
| 287 | | | | | | 16 | 26 | 5.66 | 7320.58 | 5103.62 | 5948.73 | 2203.77 |
| 288 | | | | | | 24 | 26 | 4.33 | 4932.04 | 3683.64 | 3246.71 | 1274.16 |
| 289 | | | | | | | 10 | 9 | 77328.39 | 64272.53 | 63388.69 | 28473.90 |
| 290 | | | | | | | 18 | 13 | 87720.96 | 70469.77 | 72306.24 | 32531.77 |
| 291 | | | | | | 8 | 26 | 17 | 89860.87 | 73510.18 | 75281.98 | 34337.00 |
| 292 | | | | | 2 on 1 | | 18 | 9 | 52206.69 | 48759.33 | 44553.20 | 19522.06 |
| 293 | | | | | | 16 | 26 | 13 | 59786.10 | 57637.05 | 50941.51 | 22261.97 |
| 294 | | | | 8x10 | | 24 | 26 | 9 | 38494.59 | 36475.99 | 33716.57 | 14456.00 |
| 295 | | | | | | | 10 | 8.5 | 22745.87 | 12395.00 | 14152.62 | 10323.85 |
| 296 | | | | | 4 on 1 | | 18 | 10.5 | 17503.85 | 15082.88 | 14105.65 | 10420.66 |
| 297 | | | | | | 8 | 26 | 12.5 | 18453.47 | 15862.76 | 14394.75 | 10483.97 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 298 | | | | | | | 18 | 8.5 | 14597.08 | 12369.25 | 9645.68 | 7068.14 |
| 299 | | | | | 4 on 1 | 16 | 26 | 10.5 | 13881.44 | 11567.14 | 10001.19 | 7131.41 |
| 300 | | | | | | 24 | 26 | 8.5 | 11008.65 | 9277.38 | 7377.68 | 5230.41 |
| 301 | | | | 8x10 | | | 10 | 8.33 | 16812.72 | 9054.26 | 8963.92 | 2584.56 |
| 302 | | | | | | | 18 | 9.66 | 13063.30 | 8950.66 | 8756.50 | 2591.82 |
| 303 | | | | | | 8 | 26 | 11 | 11170.58 | 7505.94 | 8828.22 | 2591.00 |
| 304 | | | | | 6 on 1 | | 18 | 8.33 | 11030.50 | 8315.55 | 6110.50 | 1766.67 |
| 305 | | | | | | 16 | 26 | 9.66 | 9354.17 | 6447.05 | 6257.65 | 1765.84 |
| 306 | | | | | | 24 | 26 | 8.33 | 8048.98 | 6070.34 | 4512.82 | 1294.91 |
| 307 | | | | | | | 10 | 11 | 84653.59 | 73837.66 | 71633.85 | 32210.95 |
| 308 | | | | | | | 18 | 15 | 85427.88 | 71715.84 | 92653.69 | 42268.92 |
| 309 | | | | | | 8 | 26 | 19 | 90423.45 | 73514.15 | 75436.61 | 34417.70 |
| 310 | 5000 | 3 | 4 | | 2 on 1 | | 18 | 11 | 57607.29 | 55688.69 | 50176.40 | 22100.62 |
| 311 | | | | | | 16 | 26 | 15 | 58752.82 | 57902.39 | 50977.33 | 22377.71 |
| 312 | | | | | | 24 | 26 | 11 | 42835.90 | 41317.99 | 38273.91 | 16364.88 |
| 313 | | | | | | | 10 | 10.5 | 15790.63 | 11531.73 | 13164.60 | 10420.66 |
| 314 | | | | | | | 18 | 12.5 | 14695.85 | 12373.82 | 13385.21 | 10483.97 |
| 315 | | | | | | 8 | 26 | 14.5 | 14077.68 | 11645.22 | 13410.83 | 10513.58 |
| 316 | | | | 10x12 | 4 on 1 | | 18 | 10.5 | 10726.20 | 9472.36 | 9169.42 | 7131.41 |
| 317 | | | | | | 16 | 26 | 12.5 | 10242.23 | 8878.98 | 9242.23 | 7161.12 |
| 318 | | | | | | 24 | 26 | 10.5 | 7936.82 | 6998.75 | 6682.28 | 5256.10 |
| 319 | | | | | | | 10 | 10.33 | 9706.22 | 5489.52 | 7782.69 | 2591.00 |
| 320 | | | | | | | 18 | 11.66 | 7079.69 | 5420.18 | 7677.31 | 2591.00 |
| 321 | | | | | | 8 | 26 | 13 | 6922.82 | 4540.03 | 7723.51 | 2591.00 |
| 322 | | | | | 6 on 1 | | 18 | 10.33 | 6387.38 | 4959.21 | 5346.08 | 1765.84 |
| 323 | | | | | | 16 | 26 | 11.66 | 5604.65 | 3828.00 | 5405.10 | 1765.84 |
| 324 | | | | | | 24 | 26 | 10.33 | 4681.23 | 3494.03 | 3806.95 | 1294.91 |
| 325 | | | | | | | 10 | 5 | 101650.28 | 85656.84 | 85811.76 | 39094.52 |
| 326 | 25000 | 0 | 0 | 4x6 | 2 on 1 | | 18 | 9 | 106086.70 | 89613.97 | 88909.23 | 40578.86 |
| 327 | | | | | | 8 | 26 | 13 | 122326.86 | 104426.02 | 102707.88 | 46754.50 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 328 | | | | | | | 18 | 5 | 73008.09 | 66592.07 | 63997.52 | 27971.61 |
| 329 | | | | | 2 on 1 | 16 | 26 | 9 | 75952.81 | 66454.65 | 65390.47 | 32778.24 |
| 330 | | | | | | 24 | 26 | 5 | 55550.12 | 54130.00 | 48471.93 | 21284.96 |
| 331 | | | | | | | 10 | 4.5 | 31597.13 | 20498.09 | 21956.37 | 14152.64 |
| 332 | | | | | | | 18 | 6.5 | 30514.64 | 22965.89 | 24263.41 | 14508.08 |
| 333 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 28111.05 | 21865.98 | 25604.96 | 14791.48 |
| 334 | | | | | | 16 | 18 | 4.5 | 23245.41 | 17221.42 | 15472.74 | 10139.38 |
| 335 | | | | | | | 26 | 6.5 | 21743.46 | 15282.44 | 17262.44 | 10422.87 |
| 336 | | | | | | 24 | 26 | 4.5 | 17256.07 | 15609.71 | 11544.96 | 7737.01 |
| 337 | | | | | | | 10 | 4.33 | 24791.36 | 13500.62 | 15939.99 | 3572.41 |
| 338 | | | | | | | 18 | 5.66 | 21678.55 | 13763.67 | 17379.86 | 3641.93 |
| 339 | | | | | | 8 | 26 | 7 | 18499.07 | 14545.17 | 18815.11 | 3694.12 |
| 340 | 25000 | 0 | 0 | | 6 on 1 | | 18 | 4.33 | 18538.69 | 13347.06 | 11148.88 | 2568.07 |
| 341 | | | | | | 16 | 26 | 5.66 | 16007.27 | 12508.99 | 12805.81 | 2620.26 |
| 342 | | | | | | 24 | 26 | 4.33 | 13984.06 | 12103.74 | 8335.50 | 1958.60 |
| 343 | | | | | | | 10 | 9 | 114310.68 | 94027.46 | 91182.39 | 40578.86 |
| 344 | | | | | | | 18 | 13 | 130652.16 | 111432.69 | 105928.01 | 46754.50 |
| 345 | | | | | | 8 | 26 | 17 | 128167.34 | 113634.93 | 107561.45 | 49490.32 |
| 346 | | | | | 2 on 1 | | 18 | 9 | 82008.08 | 76162.84 | 66826.48 | 29221.89 |
| 347 | | | | | | 16 | 26 | 13 | 93542.40 | 84711.35 | 77912.60 | 33492.84 |
| 348 | | | | | | 24 | 26 | 9 | 62153.43 | 61004.86 | 51456.52 | 22220.81 |
| 349 | | | | | | | 10 | 8.5 | 48687.61 | 31567.46 | 29431.60 | 14791.48 |
| 350 | | | | | | | 18 | 10.5 | 44615.59 | 33819.17 | 32093.66 | 15003.47 |
| 351 | | | | | | 8 | 26 | 12.5 | 40659.10 | 19428.48 | 33834.39 | 15109.92 |
| 352 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 35290.16 | 28002.75 | 21571.84 | 10634.85 |
| 353 | | | | | | 16 | 26 | 10.5 | 32621.85 | 28855.04 | 23504.91 | 10741.30 |
| 354 | | | | | | 24 | 26 | 8.5 | 26705.92 | 24262.42 | 16157.90 | 8055.51 |
| 355 | | | | | | | 10 | 8.33 | 41382.19 | 23252.88 | 24417.20 | 3720.52 |
| 356 | | | | | 6 on 1 | | 18 | 9.66 | 35834.07 | 22985.33 | 25637.08 | 3730.70 |
| 57 | | | | | | 8 | 26 | 11 | 29942.32 | 20169.80 | 26511.13 | 3729.55 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 358 | | | | | | | 18 | 8.33 | 31311.99 | 22003.94 | 17818.95 | 2656.84 |
| 359 | | | | 8x10 | 6 on 1 | 16 | 26 | 9.66 | 26331.94 | 21102.94 | 18717.57 | 2655.69 |
| 360 | | | | | | 24 | 26 | 8.33 | 23200.50 | 19874.86 | 12700.38 | 1994.03 |
| 361 | | | | | | | 10 | 11 | 119414.29 | 105328.74 | 99954.47 | 46181.53 |
| 362 | | | | | | | 18 | 15 | 122173.36 | 110155.41 | 101996.43 | 47082.21 |
| 363 | | | | | | 8 | 26 | 19 | 129519.04 | 114247.41 | 108124.09 | 49589.58 |
| 364 | | | | | 2 on 1 | | 18 | 11 | 85773.86 | 83154.54 | 73890.36 | 33202.97 |
| 365 | | | | | | 16 | 26 | 15 | 88080.88 | 83650.58 | 75344.45 | 33706.88 |
| 366 | | | | | | 24 | 26 | 11 | 65609.26 | 67602.38 | 52198.68 | 25140.19 |
| 367 | | | | | | | 10 | 10.5 | 29832.25 | 21276.79 | 24033.78 | 15003.47 |
| 368 | | | | | | | 18 | 12.5 | 28333.43 | 22788.41 | 24913.47 | 15109.92 |
| 369 | | | | | | 8 | 26 | 14.5 | 26415.84 | 19248.57 | 25455.63 | 15150.58 |
| 370 | 25000 | 0 | 0 | 10x12 | 4 on 1 | | 18 | 10.5 | 21978.21 | 18458.50 | 17293.15 | 10741.30 |
| 371 | | | | | | 16 | 26 | 12.5 | 20612.75 | 18513.43 | 17981.02 | 10781.96 |
| 372 | | | | | | 24 | 26 | 10.5 | 16618.29 | 15850.55 | 12676.85 | 8096.17 |
| 373 | | | | | | | 10 | 10.33 | 22001.74 | 12397.31 | 17532.42 | 3429.55 |
| 374 | | | | | | | 18 | 11.66 | 17357.27 | 12072.44 | 17894.46 | 3729.55 |
| 375 | | | | | | 8 | 26 | 13 | 16177.94 | 12231.32 | 17954.24 | 3729.55 |
| 376 | | | | | 6 on 1 | | 18 | 10.33 | 16474.54 | 11259.84 | 12583.00 | 2655.69 |
| 377 | | | | | | 16 | 26 | 11.66 | 13892.64 | 10821.79 | 12720.43 | 2655.69 |
| 378 | | | | | | 24 | 26 | 10.33 | 12042.52 | 9803.96 | 8686.84 | 1994.03 |
| 379 | | | | | | | 10 | 5 | 79367.48 | 65200.25 | 66894.88 | 30480.66 |
| 380 | | | | | | | 18 | 9 | 81574.62 | 67171.22 | 66735.27 | 31350.80 |
| 381 | | | | | | 8 | 26 | 13 | 94089.27 | 77369.90 | 76275.09 | 35898.73 |
| 382 | | | 2 | 4x6 | 2 on 1 | | 18 | 5 | 56348.57 | 51668.46 | 48619.28 | 21635.91 |
| 383 | | | | | | 16 | 26 | 9 | 57937.91 | 48897.42 | 48309.31 | 25032.15 |
| 384 | | | | | | 24 | 26 | 5 | 42482.04 | 41664.44 | 37208.63 | 16350.49 |
| 385 | | | | | | | 10 | 4.5 | 20718.32 | 13969.08 | 14901.06 | 11005.66 |
| 386 | | | | | | | 18 | 6.5 | 19799.40 | 15212.94 | 16086.26 | 11211.42 |
| 387 | | | | | 4 on 1 | 8 | 26 | 8.5 | 18518.72 | 14964.77 | 16623.95 | 11375.12 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 388 | | | | | | 16 | 18 | 4.5 | 15000.93 | 11645.05 | 10576.25 | 7817.89 |
| 389 | | | | | 4 on 1 | | 26 | 6.5 | 13904.83 | 10530.95 | 11060.10 | 7981.62 |
| 390 | | | | | | 24 | 26 | 4.5 | 10976.97 | 9777.73 | 7858.14 | 5910.07 |
| 391 | | | | 4x6 | | | 10 | 4.33 | 14969.76 | 8053.12 | 10332.56 | 2761.07 |
| 392 | | | | | | | 18 | 5.66 | 12913.38 | 8242.89 | 10429.72 | 2801.23 |
| 393 | | | | | | 8 | 26 | 7 | 10803.32 | 8653.19 | 10724.80 | 2831.40 |
| 394 | | | | | 6 on 1 | | 18 | 4.33 | 10907.03 | 7426.55 | 6842.25 | 1966.00 |
| 395 | | | | | | 16 | 26 | 5.66 | 9097.22 | 7354.35 | 7075.66 | 1996.18 |
| 396 | | | | | | 24 | 26 | 4.33 | 7836.99 | 6545.33 | 4783.44 | 1486.16 |
| 397 | | | | | | | 10 | 9 | 85792.05 | 70597.09 | 68377.16 | 31350.80 |
| 398 | | | | | | | 18 | 13 | 98098.34 | 80960.05 | 77476.94 | 35898.76 |
| 399 | | | | | | 8 | 26 | 17 | 98569.16 | 83610.52 | 79693.56 | 37912.95 |
| 400 | | | | | 2 on 1 | | 18 | 9 | 61033.14 | 56069.57 | 49551.42 | 22317.72 |
| 401 | | | | | | 16 | 26 | 13 | 69705.02 | 59881.30 | 56607.03 | 25515.11 |
| 402 | 25000 | 0 | 2 | | | 24 | 26 | 9 | 46013.49 | 45702.02 | 38236.48 | 16869.26 |
| 403 | | | | | | | 10 | 8.5 | 30496.75 | 19403.37 | 19301.12 | 11375.12 |
| 404 | | | | | | | 18 | 10.5 | 27984.85 | 20943.24 | 19744.59 | 11497.49 |
| 405 | | | | | | 8 | 26 | 12.5 | 25554.67 | 16318.91 | 20231.81 | 11575.97 |
| 406 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 21760.13 | 16998.19 | 13643.31 | 8103.99 |
| 407 | | | | | | 16 | 26 | 10.5 | 19824.85 | 16883.51 | 13852.93 | 8182.48 |
| 408 | | | | | | 24 | 26 | 8.5 | 15904.21 | 14363.47 | 9785.61 | 6111.00 |
| 409 | | | | | | | 10 | 8.33 | 24307.24 | 12400.03 | 14403.34 | 2850.79 |
| 410 | | | | | | | 18 | 9.66 | 20384.24 | 12153.30 | 13923.32 | 2857.98 |
| 411 | | | | | | 8 | 26 | 11 | 16793.24 | 12800.37 | 13744.88 | 2857.13 |
| 412 | | | | | 6 on 1 | | 18 | 8.33 | 17541.64 | 11713.71 | 9550.30 | 2022.75 |
| 413 | | | | | | 16 | 26 | 9.66 | 14373.59 | 11239.08 | 9436.52 | 2021.90 |
| 414 | | | | | | 24 | 26 | 8.33 | 12445.92 | 10457.98 | 6541.04 | 1511.89 |
| 415 | | | | | | | 10 | 11 | 92985.69 | 78608.82 | 76060.24 | 35559.16 |
| 416 | | | | | | | 18 | 15 | 94355.27 | 80902.96 | 76494.48 | 36095.30 |
| 417 | | | | 10x12 | 2 on 1 | 8 | 26 | 19 | 99665.95 | 83726.32 | 80125.11 | 37980.34 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 418 | 25000 | 0 | 2 | 10x12 | 2 on 1 | 16 | 18 | 11 | 66018.15 | 62599.39 | 55349.93 | 25324.91 |
| 419 | | | | | | | 26 | 15 | 67234.62 | 59400.80 | 55651.45 | 25665.33 |
| 420 | | | | | | 24 | 26 | 11 | 49949.05 | 51031.61 | 42888.58 | 19098.44 |
| 421 | | | | | 4 on 1 | 8 | 10 | 10.5 | 19831.36 | 13571.38 | 16480.80 | 11497.49 |
| 422 | | | | | | | 18 | 12.5 | 18825.48 | 14354.71 | 16522.03 | 11575.97 |
| 423 | | | | | | | 26 | 14.5 | 17375.45 | 11839.91 | 16437.88 | 11604.08 |
| 424 | | | | | | 16 | 18 | 10.5 | 14317.31 | 11586.51 | 11482.79 | 8182.48 |
| 425 | | | | | | | 26 | 12.5 | 13109.37 | 11360.90 | 11347.36 | 8210.58 |
| 426 | | | | | | 24 | 26 | 10.5 | 10322.53 | 9809.35 | 8223.55 | 6139.10 |
| 427 | | | | | 6 on 1 | 8 | 10 | 10.33 | 13061.81 | 6918.50 | 10739.54 | 2857.13 |
| 428 | | | | | | | 18 | 11.66 | 10483.20 | 6737.92 | 10552.51 | 2857.13 |
| 429 | | | | | | | 26 | 13 | 9343.12 | 7093.54 | 10419.20 | 2857.13 |
| 430 | | | | | | 16 | 18 | 10.33 | 9475.06 | 6331.26 | 7234.44 | 2021.90 |
| 431 | | | | | | | 26 | 11.66 | 7767.22 | 6087.29 | 7168.02 | 2021.90 |
| 432 | | | | | | 24 | 26 | 10.33 | 6578.82 | 5442.64 | 4882.10 | 1511.89 |
| 433 | | | 4 | 4x6 | 2 on 1 | 8 | 10 | 5 | 174071.48 | 141036.06 | 146419.19 | 66775.97 |
| 434 | | | | | | | 18 | 9 | 177829.58 | 143015.53 | 146631.20 | 68268.73 |
| 435 | | | | | | | 26 | 13 | 204706.98 | 162688.27 | 167928.00 | 77997.82 |
| 436 | | | | | | 16 | 18 | 5 | 118638.32 | 108960.20 | 104354.04 | 45489.34 |
| 437 | | | | | | | 26 | 9 | 120819.27 | 100052.02 | 104343.85 | 52499.20 |
| 438 | | | | | | 24 | 26 | 5 | 87203.46 | 85746.13 | 79148.10 | 33609.45 |
| 439 | | | | | 4 on 1 | 8 | 10 | 4.5 | 40840.59 | 25229.98 | 31262.70 | 24107.17 |
| 440 | | | | | | | 18 | 6.5 | 35938.44 | 26179.48 | 312201.32 | 24407.01 |
| 441 | | | | | | | 26 | 8.5 | 34137.33 | 27253.57 | 31214.81 | 24752.36 |
| 442 | | | | | | 16 | 18 | 4.5 | 26078.79 | 20617.46 | 20689.71 | 19395.34 |
| 443 | | | | | | | 26 | 6.5 | 24783.26 | 18940.94 | 21140.79 | 16722.37 |
| 444 | | | | | | 24 | 26 | 4.5 | 19174.00 | 17096.24 | 15008.90 | 12174.65 |
| 445 | | | | | 6 on 1 | 8 | 10 | 4.33 | 25936.06 | 12246.88 | 18340.20 | 6016.06 |
| 446 | | | | | | | 18 | 5.66 | 19451.21 | 12213.21 | 17988.56 | 6099.71 |
| 447 | | | | | | | 26 | 7 | 16893.58 | 13714.85 | 18335.05 | 6158.86 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | **Do-Nothing** Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 448 | | | | | | | 18 | 4.33 | 16031.05 | 10953.25 | 11651.11 | 4123.55 |
| 449 | | | | 4x6 | 6 on 1 | 16 | 26 | 5.66 | 13859.52 | 11165.53 | 12110.89 | 4180.60 |
| 450 | | | | | | 24 | 26 | 4.33 | 11825.01 | 9843.70 | 8136.70 | 3054.92 |
| 451 | | | | | | | 10 | 9 | 185401.72 | 146445.39 | 148378.48 | 68268.73 |
| 452 | | | | | | | 18 | 13 | 210318.81 | 168957.55 | 168119.12 | 77997.82 |
| 453 | | | | | | 8 | 26 | 17 | 215449.44 | 176244.89 | 175493.05 | 82326.01 |
| 454 | | | | | 2 on 1 | | 18 | 9 | 125170.20 | 114162.66 | 104792.52 | 46805.87 |
| 455 | | | | | | 16 | 26 | 13 | 143342.50 | 120076.89 | 119770.90 | 53375.07 |
| 456 | | | | | | 24 | 26 | 9 | 92294.23 | 91944.22 | 79624.08 | 34659.56 |
| 457 | | | | | | | 10 | 8.5 | 54535.24 | 32615.61 | 34189.80 | 24752.36 |
| 458 | | | | | | | 18 | 10.5 | 46707.82 | 34507.89 | 34281.08 | 24984.46 |
| 459 | | | | | | 8 | 26 | 12.5 | 44243.83 | 28467.22 | 34839.82 | 25136.24 |
| 460 | | | 4 | 8x10 | 4 on 1 | | 18 | 8.5 | 34997.80 | 27994.42 | 23549.46 | 16946.50 |
| 461 | | | | | | 16 | 26 | 10.5 | 33281.99 | 27857.27 | 24280.86 | 17098.19 |
| 462 | 25000 | 0 | | | | 24 | 26 | 8.5 | 26394.22 | 23902.94 | 17573.53 | 12540.37 |
| 463 | | | | | | | 10 | 8.33 | 40309.99 | 19691.00 | 22583.02 | 6196.71 |
| 464 | | | | | | | 18 | 9.66 | 31320.43 | 19479.11 | 21909.38 | 6214.13 |
| 465 | | | | | | 8 | 26 | 11 | 26782.45 | 21827.28 | 22037.89 | 6212.14 |
| 466 | | | | | 6 on 1 | | 18 | 8.33 | 26446.59 | 18248.28 | 15191.76 | 4235.75 |
| 467 | | | | | | 16 | 26 | 9.66 | 22427.46 | 18376.97 | 15450.45 | 4233.75 |
| 468 | | | | | | 24 | 26 | 8.33 | 19298.14 | 16557.63 | 11087.45 | 3104.67 |
| 469 | | | | | | | 10 | 11 | 202964.52 | 165753.08 | 166381.16 | 77228.63 |
| 470 | | | | | | | 18 | 15 | 204820.94 | 171945.14 | 166862.55 | 78421.70 |
| 471 | | | | | | 8 | 26 | 19 | 216798.27 | 177834.82 | 175780.19 | 82519.52 |
| 472 | | | | 10x12 | 2 on 1 | | 18 | 11 | 138118.59 | 129188.21 | 118079.45 | 52988.20 |
| 473 | | | | | | 16 | 26 | 15 | 140865.12 | 121393.23 | 119765.59 | 53652.56 |
| 474 | | | | | | 24 | 26 | 11 | 102702.88 | 103386.52 | 90321.11 | 39236.27 |
| 475 | | | | | | | 10 | 10.5 | 37859.43 | 25983.22 | 32519.20 | 24984.46 |
| 476 | | | | | | | 18 | 12.5 | 35234.61 | 26800.28 | 32796.04 | 25136.24 |
| 477 | | | | | 4 on 1 | 8 | 26 | 14.5 | 33752.49 | 22957.97 | 32846.00 | 25207.25 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 478 | | | | | | | 18 | 10.5 | 25717.02 | 21541.34 | 22596.82 | 17098.19 |
| 479 | | | | | 4 on 1 | 16 | 26 | 12.5 | 24556.65 | 21090.02 | 22595.46 | 17169.43 |
| 480 | | | | | | 24 | 26 | 10.5 | 19029.23 | 18271.32 | 16297.71 | 12601.98 |
| 481 | | 0 | 4 | 10x12 | | | 10 | 10.33 | 23271.52 | 12063.31 | 20001.96 | 6212.14 |
| 482 | | | | | | | 18 | 11.66 | 16974.20 | 11924.28 | 19779.26 | 6212.14 |
| 483 | | | | | 6 on 1 | 8 | 26 | 13 | 16598.08 | 13086.06 | 19845.73 | 6212.14 |
| 484 | | | | | | | 18 | 10.33 | 15314.32 | 10737.05 | 13639.33 | 4233.75 |
| 485 | | | | | | 16 | 26 | 11.66 | 13437.64 | 10814.10 | 13631.77 | 4233.75 |
| 486 | | | | | | 24 | 26 | 10.33 | 11223.66 | 9212.40 | 9702.98 | 3104.67 |
| 487 | | | | | | | 10 | 5 | 167252.73 | 140020.00 | 141192.45 | 64325.10 |
| 488 | | | | | | | 18 | 9 | 174552.31 | 147448.50 | 146288.94 | 66767.40 |
| 489 | | | | | 2 on 1 | 8 | 26 | 13 | 201273.44 | 171819.88 | 168992.88 | 76928.64 |
| 490 | | | | | | | 18 | 5 | 120125.62 | 109568.87 | 105299.85 | 46023.76 |
| 491 | | | | | | 16 | 26 | 9 | 124970.77 | 109342.76 | 107591.78 | 53932.47 |
| 492 | | | | | | 24 | 26 | 5 | 91400.74 | 89064.09 | 79754.45 | 35021.72 |
| 493 | | | | | | | 10 | 4.5 | 51989.09 | 33727.02 | 36126.45 | 23286.38 |
| 494 | | | | | | | 18 | 6.5 | 50207.98 | 37787.49 | 39922.39 | 23871.22 |
| 495 | 25000 | 3 | 0 | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 46253.20 | 35977.72 | 42129.73 | 24337.53 |
| 496 | | | | | | 16 | 18 | 4.5 | 38247.39 | 28335.69 | 25458.45 | 16683.07 |
| 497 | | | | | | | 26 | 6.5 | 35776.13 | 25145.33 | 28403.18 | 17149.51 |
| 498 | | | | | | 24 | 26 | 4.5 | 28392.69 | 24281.06 | 18995.79 | 12730.28 |
| 499 | | | | | | | 10 | 4.33 | 40791.06 | 22213.58 | 26227.24 | 5877.95 |
| 500 | | | | | | | 18 | 5.66 | 35669.32 | 22646.39 | 28596.37 | 5992.33 |
| 501 | | | | | 6 on 1 | 8 | 26 | 7 | 30437.90 | 23932.25 | 30957.89 | 6078.21 |
| 502 | | | | | | | 18 | 4.33 | 30503.09 | 20589.94 | 18344.08 | 4225.43 |
| 503 | | | | | | 16 | 26 | 5.66 | 26337.95 | 20581.97 | 21070.35 | 4311.31 |
| 504 | | | | | | 24 | 26 | 4.33 | 23009.01 | 18593.37 | 13715.01 | 3222.62 |
| 505 | | | | | | | 10 | 9 | 188083.81 | 154710.34 | 150029.12 | 66767.40 |
| 506 | | | | | | | 18 | 13 | 214971.69 | 180923.81 | 174291.20 | 76928.64 |
| 507 | | | | 8x10 | 2 on 1 | 8 | 26 | 17 | 210883.22 | 188214.78 | 176978.81 | 81430.09 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 508 | | | | | | | 18 | 9 | 134933.97 | 123494.64 | 109954.55 | 48080.94 |
| 509 | | | | | 2 on 1 | 16 | 26 | 13 | 153912.23 | 137920.75 | 128195.38 | 55108.25 |
| 510 | | | | | | 24 | 26 | 9 | 102265.65 | 100375.82 | 84665.23 | 36561.55 |
| 511 | | | | | | | 10 | 8.5 | 80109.33 | 51033.11 | 48425.98 | 24337.53 |
| 512 | | | | | | | 18 | 10.5 | 73409.34 | 57397.11 | 52806.07 | 24686.31 |
| 513 | | | | | | 8 | 26 | 12.5 | 66899.42 | 31967.12 | 55670.23 | 24861.47 |
| 514 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 58065.50 | 45528.82 | 35493.75 | 17498.31 |
| 515 | | | | | | 16 | 26 | 10.5 | 53675.14 | 47477.33 | 38674.37 | 17673.46 |
| 516 | | | | | | 24 | 26 | 8.5 | 43941.23 | 40069.73 | 26585.79 | 13254.33 |
| 517 | | | | | | | 10 | 8.33 | 68089.18 | 38259.68 | 40175.41 | 6151.65 |
| 518 | | | | | | | 18 | 9.66 | 58960.46 | 37819.45 | 42182.59 | 6138.39 |
| 519 | | | | | | 8 | 26 | 11 | 49266.32 | 38569.54 | 43620.72 | 6136.51 |
| 520 | | | | | 6 on 1 | | 18 | 8.33 | 51519.94 | 36204.71 | 29318.84 | 4371.50 |
| 521 | | | | | | 16 | 26 | 9.66 | 43325.89 | 34722.22 | 30797.41 | 4369.61 |
| 522 | 25000 | 3 | 0 | | | 24 | 26 | 8.33 | 38173.50 | 32701.57 | 20896.88 | 3280.93 |
| 523 | | | | | | | 10 | 11 | 196481.19 | 173305.19 | 164462.47 | 75985.89 |
| 524 | | | | | | | 18 | 15 | 201020.88 | 181246.86 | 167822.28 | 77467.84 |
| 525 | | | | | | 8 | 26 | 19 | 213107.23 | 187979.73 | 177904.56 | 81593.40 |
| 526 | | | | | 2 on 1 | | 18 | 11 | 141130.08 | 136820.33 | 121577.29 | 54631.30 |
| 527 | | | | | | 16 | 26 | 15 | 144925.98 | 136234.08 | 123969.80 | 55460.42 |
| 528 | | | | | | 24 | 26 | 11 | 107951.77 | 111231.20 | 92935.11 | 41365.01 |
| 529 | | | | | | | 10 | 10.5 | 49085.21 | 35008.27 | 39544.56 | 24686.31 |
| 530 | | | | | | | 18 | 12.5 | 46619.10 | 37495.46 | 40991.97 | 24861.47 |
| 531 | | | | | | 8 | 26 | 14.5 | 43463.93 | 31671.10 | 41884.03 | 24928.37 |
| 532 | | | | 10x12 | 4 on 1 | | 18 | 10.5 | 36162.37 | 30371.15 | 28453.70 | 17673.46 |
| 533 | | | | | | 16 | 26 | 12.5 | 33915.69 | 30461.52 | 29585.50 | 17740.36 |
| 534 | | | | | | 24 | 26 | 10.5 | 27343.29 | 26080.09 | 20858.16 | 13321.23 |
| 535 | | | | | | | 10 | 10.33 | 36201.09 | 20398.21 | 28847.38 | 6136.51 |
| 536 | | | | | | | 18 | 11.66 | 28559.20 | 19863.68 | 29443.08 | 6136.50 |
| 537 | | | | | 6 on 1 | 8 | 26 | 13 | 26520.04 | 20125.09 | 29541.45 | 6136.51 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 538 | | | | | | | 18 | 10.33 | 27106.79 | 18753.55 | 20703.74 | 4369.61 |
| **539** | | | **0** | **10x12** | **6 on 1** | 16 | **26** | 11.66 | 22858.59 | 17805.89 | 20929.87 | 4369.61 |
| **540** | | | | | | **24** | **26** | 10.33 | 19814.45 | 16317.27 | 14293.10 | 3280.93 |
| 541 | | | | | | | 10 | 5 | 130589.19 | 107278.80 | 110067.11 | 50152.07 |
| 542 | | | | | | | 18 | 9 | 134220.77 | 110521.78 | 109804.48 | 51583.78 |
| 543 | | | | | | 8 | 26 | 13 | 154812.05 | 127302.43 | 125501.06 | 59066.89 |
| 544 | | | | | 2 on 1 | | 18 | 5 | 92714.47 | 85013.95 | 79996.89 | 35599.16 |
| 545 | | | | | | 16 | 26 | 9 | 95329.55 | 80454.54 | 79486.90 | 41187.26 |
| 546 | | | | | | 24 | 26 | 5 | 69898.85 | 68553.59 | 61222.12 | 26902.67 |
| 547 | | | | | | | 10 | 4.5 | 34089.39 | 22984.37 | 26988.75 | 18108.42 |
| 548 | | | | | | | 18 | 6.5 | 32577.42 | 25030.98 | 26467.92 | 18446.98 |
| 549 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 30470.22 | 24622.65 | 27352.62 | 18716.32 |
| 550 | | | | | | 16 | 18 | 4.5 | 24682.14 | 19160.46 | 17401.88 | 12863.35 |
| 551 | | | | | | | 26 | 6.5 | 22878.64 | 17327.35 | 18198.01 | 13132.75 |
| 552 | 25000 | 3 | 2 | | | 24 | 26 | 4.5 | 18061.22 | 16088.02 | 12929.58 | 9727.28 |
| 553 | | | | | | | 10 | 4.33 | 24630.86 | 13250.40 | 17000.93 | 4542.99 |
| 554 | | | | | | | 18 | 5.66 | 21247.34 | 13562.64 | 17160.79 | 4609.07 |
| 555 | | | | | | 8 | 26 | 7 | 17775.51 | 14237.74 | 17646.31 | 4658.72 |
| 556 | | | | | 6 on 1 | | 18 | 4.33 | 17946.15 | 12219.46 | 11258.07 | 3234.80 |
| 557 | | | | | | 16 | 26 | 5.66 | 14968.33 | 12100.65 | 11642.11 | 3284.46 |
| 558 | | | | | | 24 | 26 | 4.33 | 12894.78 | 10769.52 | 7870.54 | 2445.29 |
| 559 | | | | | | | 10 | 9 | 141160.02 | 116158.62 | 112506.02 | 51583.78 |
| 560 | | | | | | | 18 | 13 | 161408.47 | 133209.58 | 127478.55 | 59066.89 |
| 561 | | | | | | 8 | 26 | 17 | 162183.16 | 137570.59 | 131125.73 | 62380.98 |
| 562 | | | | 8x10 | 2 on 1 | | 18 | 9 | 100422.36 | 92255.41 | 81531.29 | 36721.00 |
| 563 | | | | | | 16 | 26 | 13 | 114690.83 | 98527.14 | 93139.74 | 41981.90 |
| 564 | | | | | | 24 | 26 | 9 | 75709.41 | 75196.93 | 62913.32 | 27756.25 |
| 565 | | | | | | | 10 | 8.5 | 50178.55 | 31925.80 | 31757.56 | 18716.32 |
| 566 | | | | | | | 18 | 10.5 | 46045.55 | 34459.46 | 32487.23 | 18917.68 |
| 567 | | | | | 4 on 1 | 8 | 26 | 12.5 | 42047.00 | 26850.72 | 33288.90 | 19046.81 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 568 | | | | | | | 18 | 8.5 | 35803.55 | 27968.38 | 22448.35 | 13334.10 |
| 569 | | | | | 4 on 1 | 16 | 26 | 10.5 | 32619.30 | 27779.69 | 22793.25 | 13463.24 |
| 570 | | | | | | 24 | 26 | 8.5 | 26168.37 | 23633.28 | 16101.00 | 10054.87 |
| 571 | | | | 8x10 | | | 10 | 8.33 | 39994.50 | 20402.69 | 23715.34 | 4690.62 |
| 572 | | | | | | | 18 | 9.66 | 33539.70 | 19996.73 | 22909.07 | 4702.45 |
| 573 | | | | | | 8 | 26 | 11 | 27631.16 | 21061.40 | 22615.46 | 4701.04 |
| 574 | | | | | 6 on 1 | | 18 | 8.33 | 28862.56 | 19273.44 | 15713.82 | 3328.18 |
| 575 | | | | | | 16 | 26 | 9.66 | 23649.93 | 18492.50 | 15526.60 | 3326.78 |
| 576 | | | | | | 24 | 26 | 8.33 | 20478.20 | 17207.30 | 10762.46 | 2487.60 |
| 577 | | | | | | | 10 | 11 | 152996.23 | 129340.92 | 125147.55 | 58508.11 |
| 578 | | | | | | | 18 | 15 | 155249.70 | 133115.64 | 125862.04 | 59390.28 |
| 579 | | | | | | 8 | 26 | 19 | 163987.77 | 137761.12 | 131835.78 | 62491.87 |
| 580 | 25000 | 3 | 2 | | 2 on 1 | | 18 | 11 | 108624.55 | 102999.41 | 91071.34 | 41668.95 |
| 581 | | | | | | 16 | 26 | 15 | 110626.11 | 97736.54 | 91567.46 | 42229.07 |
| 582 | | | | | | 24 | 26 | 11 | 82184.88 | 83966.09 | 70567.76 | 31424.08 |
| 583 | | | | | | | 10 | 10.5 | 32630.00 | 22329.99 | 27117.09 | 18917.68 |
| 584 | | | | | | | 18 | 12.5 | 30974.95 | 23618.87 | 27184.92 | 19046.81 |
| 585 | | | | | | 8 | 26 | 14.5 | 28589.12 | 19481.08 | 27046.47 | 19093.04 |
| 586 | | | | 10x12 | 4 on 1 | | 18 | 10.5 | 23557.33 | 19064.14 | 18893.49 | 13463.24 |
| 587 | | | | | | 16 | 26 | 12.5 | 21569.81 | 18692.93 | 18670.65 | 13509.47 |
| 588 | | | | | | 24 | 26 | 10.5 | 16984.42 | 16140.05 | 13530.81 | 10101.11 |
| 589 | | | | | | | 10 | 10.33 | 21491.56 | 11383.52 | 17670.56 | 4701.04 |
| 590 | | | | | | | 18 | 11.66 | 17248.79 | 11086.40 | 17362.83 | 4701.04 |
| 591 | | | | | | 8 | 26 | 13 | 15372.93 | 11671.53 | 17143.49 | 4701.04 |
| 592 | | | | | 6 on 1 | | 18 | 10.33 | 15590.02 | 10417.29 | 11903.37 | 3326.78 |
| 593 | | | | | | 16 | 26 | 11.66 | 12779.98 | 10015.87 | 11794.08 | 3326.78 |
| 594 | | | | | | 24 | 26 | 10.33 | 10824.62 | 8955.17 | 8032.88 | 2487.62 |
| 595 | | | | | | | 10 | 5 | 286412.72 | 232057.09 | 240914.36 | 109871.45 |
| 596 | | | | | | | 18 | 9 | 292596.19 | 235314.06 | 241263.20 | 112327.58 |
| 597 | | | 4 | 4x6 | 2 on 1 | 8 | 26 | 13 | 336819.59 | 267683.06 | 276304.41 | 128335.59 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 598 | | | | | | | 18 | 5 | 195204.42 | 179280.30 | 171701.44 | 74846.99 |
| 599 | | | | | 2 on 1 | 16 | 26 | 9 | 198792.91 | 164623.02 | 171684.69 | 86380.83 |
| 600 | | | | | | 24 | 26 | 5 | 143482.33 | 141084.48 | 130228.23 | 55300.12 |
| 601 | | | | | | | 10 | 4.5 | 67198.05 | 41512.75 | 51438.83 | 39665.31 |
| 602 | | | | | | | 18 | 6.5 | 59132.18 | 43075.05 | 51337.85 | 40158.66 |
| 603 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 56168.68 | 44842.32 | 51360.04 | 40726.90 |
| 604 | | | | | | 16 | 18 | 4.5 | 42909.38 | 33923.43 | 34042.32 | 26976.47 |
| 605 | | | | | | | 26 | 6.5 | 40777.74 | 31164.93 | 34784.51 | 27514.55 |
| 606 | | | | | | 24 | 26 | 4.5 | 31578.41 | 28129.72 | 24695.25 | 20031.86 |
| 607 | | | | | | | 10 | 4.33 | 42674.53 | 20150.70 | 30176.49 | 9898.67 |
| 608 | | | | | | | 18 | 5.66 | 32004.52 | 20095.29 | 29597.92 | 10036.30 |
| 609 | | | | | | 8 | 26 | 7 | 27796.26 | 22566.06 | 30168.02 | 10133.63 |
| 610 | 25000 | 3 | 4 | | 6 on 1 | | 18 | 4.33 | 26377.07 | 18022.20 | 19170.44 | 6784.79 |
| 611 | | | | | | 16 | 26 | 5.66 | 22804.10 | 18371.47 | 19926.95 | 6878.65 |
| 612 | | | | | | 24 | 26 | 4.33 | 19456.56 | 16196.57 | 13387.91 | 5026.48 |
| 613 | | | | | | | 10 | 9 | 305055.19 | 240957.45 | 244138.12 | 112327.58 |
| 614 | | | | | | | 18 | 13 | 346053.16 | 277998.38 | 276618.84 | 128335.59 |
| 615 | | | | | | 8 | 26 | 17 | 354494.94 | 289988.75 | 288751.75 | 135457.08 |
| 616 | | | | | 2 on 1 | | 18 | 9 | 205951.80 | 187840.28 | 172422.92 | 77013.17 |
| 617 | | | | | | 16 | 26 | 13 | 235852.05 | 197571.42 | 197067.94 | 87821.96 |
| 618 | | | | | | 24 | 26 | 9 | 151858.53 | 151282.64 | 131011.41 | 57027.95 |
| 619 | | | | | | | 10 | 8.5 | 89730.88 | 53664.89 | 56255.01 | 40726.90 |
| 620 | | | | | | | 18 | 10.5 | 76851.84 | 56778.38 | 56405.20 | 41108.79 |
| 621 | | | | | | 8 | 26 | 12.5 | 72797.66 | 46838.90 | 57324.54 | 41358.52 |
| 622 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 57584.48 | 46061.29 | 38747.68 | 27883.34 |
| 623 | | | | | | 16 | 26 | 10.5 | 54761.32 | 45835.63 | 39951.09 | 28132.92 |
| 624 | | | | | | 24 | 26 | 8.5 | 43428.37 | 39329.28 | 28915.03 | 20633.59 |
| 625 | | | | | | | 10 | 8.33 | 66325.02 | 32399.06 | 37157.51 | 10195.91 |
| 626 | | | | | | | 18 | 9.66 | 51533.82 | 32050.42 | 36049.12 | 10224.57 |
| 627 | | | | | 6 on 1 | 8 | 26 | 11 | 44067.16 | 35914.04 | 36260.57 | 10221.30 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 628 | | | | | | | 18 | 8.33 | 43514.54 | 30025.25 | 24996.12 | 6969.38 |
| 629 | | | | 8x10 | 6 on 1 | 16 | 26 | 9.66 | 36901.56 | 30236.99 | 25421.78 | 6966.11 |
| 630 | | | | | | 24 | 26 | 8.33 | 31752.67 | 27243.50 | 18243.00 | 5108.35 |
| 631 | | | | | | | 10 | 11 | 333952.56 | 272725.84 | 273759.25 | 127069.99 |
| 632 | | | | | | | 18 | 15 | 337007.09 | 282914.09 | 274551.34 | 129033.05 |
| 633 | | | | | | 8 | 26 | 19 | 356714.28 | 292604.78 | 289224.19 | 135775.47 |
| 634 | | | | | 2 on 1 | | 18 | 11 | 227256.77 | 212562.95 | 194284.84 | 87185.41 |
| 635 | | | | | | 16 | 26 | 15 | 231775.83 | 199737.30 | 197059.20 | 88278.54 |
| 636 | | | | | | 24 | 26 | 11 | 168984.67 | 170109.52 | 148612.02 | 64558.35 |
| 637 | | | | | | | 10 | 10.5 | 62292.93 | 42752.12 | 53506.26 | 41108.79 |
| 638 | | | | | | | 18 | 12.5 | 57974.11 | 44096.49 | 539061.76 | 41358.52 |
| 639 | | | | | | 8 | 26 | 14.5 | 55535.47 | 37774.45 | 54043.96 | 41475.36 |
| 640 | 25000 | 3 | 4 | 10x12 | 4 on 1 | | 18 | 10.5 | 42314.12 | 35443.57 | 37180.22 | 28132.92 |
| 641 | | | | | | 16 | 26 | 12.5 | 40404.88 | 34700.97 | 37177.99 | 28250.13 |
| 642 | | | | | | 24 | 26 | 10.5 | 31310.21 | 30063.16 | 26815.84 | 20734.94 |
| 643 | | | | | | | 10 | 10.33 | 38290.36 | 19848.65 | 32910.71 | 10221.30 |
| 644 | | | | | | | 18 | 11.66 | 27928.91 | 19619.90 | 32544.29 | 10221.30 |
| 645 | | | | | | 8 | 26 | 13 | 27310.05 | 21531.46 | 32653.65 | 10221.30 |
| 646 | | | | | 6 on 1 | | 18 | 10.33 | 25197.78 | 17666.47 | 22441.80 | 6966.11 |
| 647 | | | | | | 16 | 26 | 11.66 | 22109.95 | 17793.24 | 22429.36 | 6966.11 |
| 648 | | | | | | 24 | 26 | 10.33 | 18467.12 | 15157.84 | 15965.03 | 5108.35 |
| 649 | | | | | | | 10 | 5 | 240203.88 | 201092.94 | 202776.80 | 92381.98 |
| 650 | | | | | | | 18 | 9 | 250687.33 | 211761.56 | 210096.22 | 95889.53 |
| 651 | | | | | | 8 | 26 | 13 | 289063.50 | 246763.06 | 242703.02 | 110482.84 |
| 652 | | | | | 2 on 1 | | 18 | 5 | 172521.19 | 157359.86 | 151228.81 | 66098.09 |
| 653 | 50000 | 0 | 0 | | | 16 | 26 | 9 | 179479.69 | 157035.13 | 154520.42 | 77456.36 |
| 654 | | | | | | 24 | 26 | 5 | 131267.28 | 127911.45 | 114541.20 | 50297.25 |
| 655 | | | | | | | 10 | 4.5 | 74665.34 | 48437.85 | 51883.83 | 33443.28 |
| 656 | | | | | | | 18 | 6.5 | 72107.37 | 54269.37 | 57335.46 | 34283.20 |
| 657 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 66427.60 | 51670.23 | 69943.60 | 34952.90 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 658 | **50000** | **0** | **0** | 4x6 | 4 on 1 | 16 | 18 | 4.5 | 54929.88 | 40694.95 | 36562.74 | 23959.78 |
| 659 | | | | | | | 26 | 6.5 | 51380.71 | 36113.05 | 46106.29 | 24629.67 |
| 660 | | | | | | 24 | 26 | 4.5 | 40776.81 | 34871.81 | 30251.47 | 18282.89 |
| 661 | | | | | 6 on 1 | 8 | 10 | 4.33 | 58583.02 | 31902.54 | 37666.86 | 8441.75 |
| 662 | | | | | | | 18 | 5.66 | 51227.32 | 32524.13 | 50515.63 | 8606.02 |
| 663 | | | | | | | 26 | 7 | 43714.09 | 34370.86 | 54162.59 | 8729.36 |
| 664 | | | | | | 16 | 18 | 4.33 | 43807.71 | 29570.71 | 31660.48 | 6068.45 |
| 665 | | | | | | | 26 | 5.66 | 37825.85 | 29559.27 | 35425.90 | 6191.79 |
| 666 | | | | | | 24 | 26 | 4.33 | 33044.92 | 26703.29 | 23072.04 | 4628.24 |
| 667 | | | | 8x10 | 2 on 1 | 8 | 10 | 9 | 270120.94 | 222190.83 | 215467.81 | 95889.53 |
| 668 | | | | | | | 18 | 13 | 308736.56 | 259837.91 | 250312.33 | 110482.84 |
| 669 | | | | | | | 26 | 17 | 302864.78 | 270309.00 | 254172.20 | 116947.70 |
| 670 | | | | | | 16 | 18 | 9 | 193788.53 | 177359.67 | 157913.77 | 69052.55 |
| 671 | | | | | | | 26 | 13 | 221044.61 | 198078.06 | 184110.75 | 79144.98 |
| 672 | | | | | | 24 | 26 | 9 | 146871.17 | 144157.06 | 121593.92 | 52508.71 |
| 673 | | | | | 4 on 1 | 8 | 10 | 8.5 | 115050.86 | 73292.38 | 69548.09 | 34952.90 |
| 674 | | | | | | | 18 | 10.5 | 105428.51 | 82432.17 | 75838.66 | 35453.82 |
| 675 | | | | | | | 26 | 12.5 | 96079.16 | 45910.31 | 90490.00 | 35705.38 |
| 676 | | | | | | 16 | 18 | 8.5 | 83392.12 | 65387.27 | 50975.17 | 25130.60 |
| 677 | | | | | | | 26 | 10.5 | 77086.79 | 68185.66 | 61517.34 | 25382.15 |
| 678 | | | | | | 24 | 26 | 8.5 | 63107.21 | 57547.06 | 41998.76 | 19035.51 |
| 679 | | | | | 6 on 1 | 8 | 10 | 8.33 | 97787.84 | 54947.52 | 57698.86 | 8791.74 |
| 680 | | | | | | | 18 | 9.66 | 84677.41 | 54315.29 | 71193.39 | 8815.79 |
| 681 | | | | | | | 26 | 11 | 70754.95 | 55392.53 | 73291.05 | 8813.09 |
| 682 | | | | | | 16 | 18 | 8.33 | 73991.55 | 51996.23 | 48333.79 | 6278.22 |
| 683 | | | | | | | 26 | 9.66 | 62223.48 | 49867.13 | 50593.68 | 6275.51 |
| 684 | | | | | | 24 | 26 | 8.33 | 54823.77 | 46965.12 | 34298.24 | 4711.98 |
| 685 | | | | 10x12 | 2 on 1 | 8 | 10 | 11 | 282180.97 | 248896.23 | 236196.59 | 109128.89 |
| 686 | | | | | | | 18 | 15 | 288700.78 | 260301.86 | 241021.84 | 111257.23 |
| 687 | | | | | | | 26 | 19 | 306058.91 | 269971.44 | 255501.75 | 117182.25 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **688** | | | | | | | **18** | 11 | 202687.23 | 196497.67 | 174606.03 | 78460.01 |
| **689** | | | | | **2 on 1** | **16** | **26** | 15 | 208138.80 | 195655.72 | 178042.09 | 79650.77 |
| **690** | | | | | | **24** | **26** | 11 | 155037.42 | 159747.25 | 133470.91 | 59407.31 |
| **691** | | | | | | | **10** | 10.5 | 70494.87 | 50277.94 | 56792.83 | 35453.82 |
| **692** | | | | | | | **18** | 12.5 | 66953.09 | 53849.96 | 58871.57 | 35705.38 |
| **693** | | | | | | **8** | **26** | 14.5 | 62421.73 | 45485.18 | 70370.97 | 35801.46 |
| **694** | | | **0** | **10x12** | **4 on 1** | | **18** | 10.5 | 51935.43 | 43618.22 | 40864.44 | 25382.15 |
| **695** | | | | | | **16** | **26** | 12.5 | 48708.80 | 43748.02 | 48922.36 | 25478.23 |
| **696** | | | | | | **24** | **26** | 10.5 | 39269.70 | 37455.52 | 33919.30 | 19131.60 |
| **697** | | | | | | | **10** | 10.33 | 51991.04 | 29295.36 | 41429.84 | 8813.09 |
| **698** | | | | | | | **18** | 11.66 | 41015.95 | 28527.68 | 52577.15 | 8813.09 |
| **699** | | | | | | **8** | **26** | 13 | 38087.36 | 28903.11 | 52906.33 | 8813.09 |
| **700** | | | | | **6 on 1** | | **18** | 10.33 | 38930.04 | 26933.35 | 36381.31 | 6275.51 |
| **701** | | | | | | **16** | **26** | 11.66 | 32828.89 | 25572.34 | 36878.42 | 6275.51 |
| **702** | **50000** | **0** | | | | **24** | **26** | 10.33 | 28456.97 | 23434.42 | 25025.89 | 4711.98 |
| **703** | | | | | | | **10** | 5 | 187548.67 | 154070.92 | 158075.42 | 72027.07 |
| **704** | | | | | | | **18** | 9 | 192764.25 | 158728.41 | 157698.23 | 74083.25 |
| **705** | | | | | | **8** | **26** | 13 | 222336.89 | 182828.31 | 180241.23 | 84830.28 |
| **706** | | | | | **2 on 1** | | **18** | 5 | 133154.02 | 122094.74 | 114889.40 | 51126.55 |
| **707** | | | | | | **16** | **26** | 9 | 136909.72 | 115546.65 | 114156.94 | 59152.03 |
| **708** | | | | | | **24** | **26** | 5 | 100386.85 | 98454.82 | 87925.56 | 38636.88 |
| **709** | | | | | | | **10** | 4.5 | 48958.26 | 33009.52 | 35211.84 | 26006.83 |
| **710** | | | | | | | **18** | 6.5 | 46786.82 | 35948.82 | 38012.52 | 26493.05 |
| **711** | | | **2** | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 43760.50 | 35362.39 | 48661.93 | 26879.88 |
| **712** | | | | | | **16** | **18** | 4.5 | 35447.83 | 27517.73 | 24992.12 | 18473.99 |
| **713** | | | | | | | **26** | 6.5 | 32857.69 | 24885.07 | 31673.75 | 18860.90 |
| **714** | | | | | | **24** | **26** | 4.5 | 25939.04 | 23105.18 | 21531.56 | 13965.75 |
| **715** | | | | | | | **10** | 4.33 | 35374.18 | 19029.87 | 24416.27 | 6524.52 |
| **716** | | | | | | | **18** | 5.66 | 30514.86 | 19478.30 | 33911.80 | 6619.42 |
| **717** | | | | | **6 on 1** | **8** | **26** | 7 | 25528.71 | 20447.86 | 35046.82 | 6690.73 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 718 | | | | | | | 18 | 4.33 | 25773.77 | 17549.26 | 21276.87 | 4645.74 |
| 719 | | | | 4x6 | 6 on 1 | 16 | 26 | 5.66 | 21497.12 | 17378.63 | 22390.08 | 4717.05 |
| 720 | | | | | | 24 | 26 | 4.33 | 18519.14 | 15466.90 | 14635.44 | 3511.86 |
| 721 | | | | | | | 10 | 9 | 202730.20 | 166823.88 | 161578.11 | 74083.25 |
| 722 | | | | | | | 18 | 13 | 231810.48 | 191312.00 | 183081.25 | 84830.28 |
| 723 | | | | | | 8 | 26 | 17 | 232923.08 | 197575.17 | 188319.23 | 89589.89 |
| 724 | | | | | 2 on 1 | | 18 | 9 | 144223.89 | 132494.73 | 117093.04 | 52737.70 |
| 725 | | | | | | 16 | 26 | 13 | 164715.88 | 141502.03 | 133764.78 | 60293.27 |
| 726 | | | | | | 24 | 26 | 9 | 108731.80 | 107995.80 | 90354.41 | 39862.78 |
| 727 | | | | | | | 10 | 8.5 | 72065.09 | 45850.98 | 45609.36 | 26879.88 |
| 728 | | | | | | | 18 | 10.5 | 66129.38 | 49489.75 | 46657.29 | 27169.05 |
| 729 | | | | | | 8 | 26 | 12.5 | 60386.76 | 38562.28 | 57640.45 | 27354.51 |
| 730 | 50000 | 0 | 2 | 8x10 | 4 on 1 | | 18 | 8.5 | 51420.10 | 40167.44 | 32239.71 | 19150.08 |
| 731 | | | | | | 16 | 26 | 10.5 | 46846.96 | 39896.44 | 38665.05 | 19335.54 |
| 732 | | | | | | 24 | 26 | 8.5 | 37528.31 | 33941.47 | 26891.29 | 14440.54 |
| 733 | | | | | | | 10 | 8.33 | 57439.03 | 29301.79 | 34059.33 | 6736.55 |
| 734 | | | | | | | 18 | 9.66 | 48168.81 | 28718.76 | 42755.93 | 6753.53 |
| 735 | | | | | | 8 | 26 | 11 | 39683.13 | 30247.82 | 42622.91 | 6751.51 |
| 736 | | | | | 6 on 1 | | 18 | 8.33 | 41451.63 | 27680.00 | 28675.81 | 4779.84 |
| 737 | | | | | | 16 | 26 | 9.66 | 33965.40 | 26558.43 | 28645.35 | 4777.83 |
| 738 | | | | | | 24 | 26 | 8.33 | 29410.23 | 24712.66 | 19579.56 | 3572.65 |
| 739 | | | | | | | 10 | 11 | 219729.08 | 185755.95 | 179733.55 | 84027.77 |
| 740 | | | | | | | 18 | 15 | 222965.44 | 191177.09 | 180759.67 | 85294.72 |
| 741 | | | | | | 8 | 26 | 19 | 235514.81 | 197848.81 | 189338.98 | 89749.14 |
| 742 | | | | 10x12 | 2 on 1 | | 18 | 11 | 156003.66 | 147924.97 | 130794.20 | 59843.82 |
| 743 | | | | | | 16 | 26 | 15 | 158878.23 | 140366.58 | 131506.72 | 60648.25 |
| 744 | | | | | | 24 | 26 | 11 | 118031.71 | 120589.84 | 101347.51 | 45130.41 |
| 745 | | | | | | | 10 | 10.5 | 46862.33 | 32069.74 | 38944.84 | 27169.05 |
| 746 | | | | | | | 18 | 12.5 | 44485.39 | 33920.79 | 39042.25 | 27354.51 |
| 747 | | | | | 4 on 1 | 8 | 26 | 14.5 | 41058.93 | 27978.20 | 48736.07 | 27420.92 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **748** | | | | | | | **18** | 10.5 | 33832.40 | 27379.41 | 27134.32 | 19335.54 |
| **749** | | | | | **4 on 1** | **16** | **26** | 12.5 | 31002.76 | 26846.29 | 33111.82 | 19401.94 |
| **750** | | | **2** | **10x12** | | **24** | **26** | 10.5 | 24392.57 | 23179.90 | 23322.88 | 14506.94 |
| **751** | | | | | | | **10** | 10.33 | 20865.59 | 16348.71 | 25377.98 | 6751.51 |
| **752** | | | | | | | **18** | 11.66 | 24772.25 | 15921.99 | 34638.57 | 6751.51 |
| **753** | | | | | | **8** | **26** | 13 | 22078.19 | 16762.33 | 34655.07 | 6751.51 |
| **754** | | | | | **6 on 1** | | **18** | 10.33 | 22389.96 | 14961.03 | 23480.79 | 4777.83 |
| **755** | | | | | | **16** | **26** | 11.66 | 18354.26 | 14384.53 | 23458.86 | 4777.83 |
| **756** | | | | | | **24** | **26** | 10.33 | 15546.03 | 12861.18 | 15855.31 | 3572.65 |
| **757** | | | | | | | **10** | 5 | 411338.22 | 333274.97 | 345994.69 | 157794.41 |
| **758** | | | | | | | **18** | 9 | 420218.75 | 337951.69 | 346495.69 | 161321.86 |
| **759** | | | | | | **8** | **26** | 13 | 483731.19 | 386045.28 | 396820.91 | 183792.56 |
| **760** | | | | | **2 on 1** | | **18** | 5 | 280347.31 | 257477.52 | 246592.97 | 107493.23 |
| **761** | | | | | | **16** | **26** | 9 | 285501.00 | 236427.12 | 246568.91 | 124057.81 |
| **762** | **50000** | **0** | | | | **24** | **26** | 5 | 206065.44 | 202621.72 | 187030.28 | 79420.55 |
| **763** | | | | | | | **10** | 4.5 | 96508.04 | 59619.50 | 73875.06 | 59966.25 |
| **764** | | | | | | | **18** | 6.5 | 84924.04 | 61863.22 | 73730.03 | 57674.78 |
| **765** | | | **4** | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 80667.95 | 64401.33 | 102034.45 | 58490.87 |
| **766** | | | | | | **16** | **18** | 4.5 | 61625.29 | 48719.92 | 48890.66 | 38742.88 |
| **767** | | | | | | | **26** | 6.5 | 58563.89 | 44758.23 | 65931.56 | 39515.66 |
| **768** | | | | | | **24** | **26** | 4.5 | 45308.97 | 40399.14 | 44637.75 | 28769.21 |
| **769** | | | | | | | **10** | 4.33 | 61288.01 | 28939.88 | 43338.66 | 14216.21 |
| **770** | | | | | | | **18** | 5.66 | 45964.02 | 28860.32 | 70306.85 | 14413.86 |
| **771** | | | | | | **8** | **26** | 7 | 39920.24 | 32408.76 | 72161.40 | 14553.65 |
| **772** | | | | | **6 on 1** | | **18** | 4.33 | 37882.04 | 25883.00 | 43396.26 | 9744.13 |
| **773** | | | | | | **16** | **26** | 5.66 | 32750.62 | 26384.61 | 45361.67 | 9878.94 |
| **774** | | | | | | **24** | **26** | 4.33 | 27942.99 | 23261.07 | 28875.45 | 7218.89 |
| **775** | | | | | | | **10** | 9 | 438112.03 | 346056.59 | 350624.59 | 161321.86 |
| **776** | | | | | | | **18** | 13 | 496992.12 | 399253.78 | 397272.53 | 184312.12 |
| **777** | | | | **8x10** | **2 on 1** | **8** | **26** | 17 | 509116.06 | 416474.06 | 414697.44 | 194539.81 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **778** | | | | | | | **18** | 9 | 295782.41 | 269771.16 | 247629.14 | 110604.24 |
| **779** | | | | | **2 on 1** | **16** | **26** | 13 | 78646.73 | 65827.89 | 75051.09 | 40403.74 |
| **780** | | | | | | **24** | **26** | 9 | 218095.14 | 217268.03 | 188155.05 | 7233.30 |
| **781** | | | | | | | **10** | 8.5 | 128869.06 | 77072.06 | 80791.93 | 58490.87 |
| **782** | | | | | | | **18** | 10.5 | 110372.55 | 81543.58 | 81007.63 | 59039.34 |
| **783** | | | | | | **8** | **26** | 12.5 | 104550.03 | 69282.37 | 82327.95 | 59397.99 |
| **784** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 82701.28 | 66151.28 | 55648.37 | 40045.30 |
| **785** | | | | | | **16** | **26** | 10.5 | 78646.73 | 65827.89 | 75051.09 | 40403.74 |
| **786** | | | | | | **24** | **26** | 8.5 | 62370.65 | 56483.65 | 52432.45 | 29633.41 |
| **787** | | | | | | | **10** | 8.33 | 95254.20 | 46530.65 | 53364.61 | 14643.08 |
| **788** | | | | | | | **18** | 9.66 | 74011.48 | 46029.95 | 81099.95 | 146684.25 |
| **789** | | | | | | **8** | **26** | 11 | 63288.06 | 51578.77 | 82152.93 | 14679.55 |
| **790** | | | | | **6 on 1** | | **18** | 8.33 | 62494.41 | 43121.45 | 53559.82 | 10009.24 |
| **791** | | | | | | **16** | **26** | 9.66 | 52997.02 | 43425.55 | 54945.74 | 10004.54 |
| **792** | **50000** | **0** | **4** | | | **24** | **26** | 8.33 | 45602.32 | 39126.38 | 38326.12 | 7336.47 |
| **793** | | | | | | | **10** | 11 | 479613.66 | 391681.50 | 393165.62 | 182494.50 |
| **794** | | | | | | | **18** | 15 | 484000.47 | 406313.56 | 396303.22 | 185313.77 |
| **795** | | | | | | **8** | **26** | 19 | 512303.41 | 420231.09 | 415375.97 | 194997.06 |
| **796** | | | | | **2 on 1** | | **18** | 11 | 326380.03 | 305277.16 | 279026.69 | 125213.33 |
| **797** | | | | | | **16** | **26** | 15 | 332870.19 | 286857.31 | 283011.69 | 126783.26 |
| **798** | | | | | | **24** | **26** | 11 | 242691.22 | 244306.69 | 213432.56 | 92716.95 |
| **799** | | | | | | | **10** | 10.5 | 89463.43 | 61399.45 | 76844.24 | 59039.34 |
| **800** | | | | | | | **18** | 12.5 | 83260.85 | 63330.19 | 77498.42 | 59397.99 |
| **801** | | | | | | **8** | **26** | 14.5 | 79758.55 | 54358.41 | 77616.47 | 59565.79 |
| **802** | | | | **10x12** | **4 on 1** | | **18** | 10.5 | 60770.39 | 50903.10 | 53397.23 | 40403.74 |
| **803** | | | | | | **16** | **26** | 12.5 | 58028.40 | 49836.60 | 71757.96 | 40572.07 |
| **804** | | | | | | **24** | **26** | 10.5 | 44966.88 | 43175.90 | 50500.67 | 29779.01 |
| **805** | | | | | | | **10** | 10.33 | 54991.59 | 28506.10 | 47265.48 | 14679.55 |
| **806** | | | | | | | **18** | 11.66 | 40110.74 | 28177.56 | 76781.62 | 14679.55 |
| **807** | | | | | **6 on 1** | **8** | **26** | 13 | 39221.96 | 30922.91 | 77415.63 | 14679.55 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 808 | | | | | | | 18 | 10.33 | 36188.38 | 25372.11 | 31120.85 | 10004.54 |
| 809 | | 0 | 4 | 10x12 | 6 on 1 | 16 | 26 | 11.66 | 31753.72 | 25554.18 | 51886.74 | 10004.54 |
| 810 | | | | | | 24 | 26 | 10.33 | 26521.98 | 21769.28 | 35780.70 | 7336.47 |
| 811 | | | | | | | 10 | 5 | 442797.16 | 370931.97 | 374462.19 | 170214.30 |
| 812 | | | | | | | 18 | 9 | 461863.72 | 390172.16 | 388002.00 | 176584.34 |
| 813 | | | | | | 8 | 26 | 13 | 532196.38 | 454871.84 | 447382.62 | 203381.48 |
| 814 | | | | | 2 on 1 | | 18 | 5 | 313539.78 | 287436.91 | 274662.75 | 120114.35 |
| 815 | | | | | | 16 | 26 | 9 | 325896.62 | 286155.97 | 280738.47 | 140791.83 |
| 816 | | | | | | 24 | 26 | 5 | 239249.30 | 234040.09 | 209545.08 | 91826.14 |
| 817 | | | | | | | 10 | 4.5 | 137513.84 | 87540.92 | 95626.51 | 61619.40 |
| 818 | | | | | | | 18 | 6.5 | 131821.06 | 97446.56 | 105098.91 | 63126.52 |
| 819 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 120518.84 | 94231.27 | 127930.92 | 64367.25 |
| 820 | | | | | | 16 | 18 | 4.5 | 99578.02 | 73700.25 | 66035.16 | 43527.93 |
| 821 | | | | | | | 26 | 6.5 | 92583.79 | 65623.99 | 83313.81 | 44768.97 |
| 822 | | | | | | 24 | 26 | 4.5 | 73650.48 | 63594.55 | 54823.97 | 33356.89 |
| 823 | 50000 | 3 | 0 | | | | 10 | 4.33 | 107323.48 | 57351.90 | 68953.19 | 15548.57 |
| 824 | | | | | | | 18 | 5.66 | 93029.48 | 58047.17 | 92329.66 | 15852.98 |
| 825 | | | | | | 8 | 26 | 7 | 78872.34 | 62172.66 | 98976.18 | 16068.13 |
| 826 | | | | | 6 on 1 | | 18 | 4.33 | 79331.44 | 53181.27 | 57072.41 | 11033.34 |
| 827 | | | | | | 16 | 26 | 5.66 | 68115.66 | 53375.21 | 64038.88 | 1124.51 |
| 828 | | | | | | 24 | 26 | 4.33 | 59582.56 | 48151.04 | 41746.60 | 8436.66 |
| 829 | | | | | | | 10 | 9 | 497910.19 | 409064.47 | 398498.75 | 176584.34 |
| 830 | | | | | | | 18 | 13 | 567983.31 | 477824.28 | 461644.56 | 203381.48 |
| 831 | | | | | | 8 | 26 | 17 | 557956.69 | 498029.53 | 468988.78 | 215053.33 |
| 832 | | | | 8x10 | 2 on 1 | | 18 | 9 | 351639.72 | 323134.34 | 286575.66 | 125515.83 |
| 833 | | | | | | 16 | 26 | 13 | 401388.06 | 360499.28 | 334492.88 | 14707.59 |
| 834 | | | | | | 24 | 26 | 9 | 267594.25 | 263897.53 | 221943.78 | 95702.66 |
| 835 | | | | | | | 10 | 8.5 | 210586.03 | 133110.53 | 127993.23 | 64367.25 |
| 836 | | | | | | | 18 | 10.5 | 192298.38 | 149188.25 | 139400.25 | 65241.52 |
| 837 | | | | | 4 on 1 | 8 | 26 | 12.5 | 174182.11 | 82934.88 | 165038.56 | 65655.98 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 838 | | | | | | | 18 | 8.5 | 1511.87.50 | 117994.38 | 91940.80 | 45643.27 |
| 839 | | | | | 4 on 1 | 16 | 26 | 10.5 | 139134.39 | 123213.87 | 111232.30 | 46057.73 |
| 840 | | | | 8x10 | | 24 | 26 | 8.5 | 114112.53 | 104090.22 | 76121.33 | 34645.92 |
| 841 | | | | | | | 10 | 8.33 | 178681.75 | 98837.92 | 106033.95 | 16170.85 |
| 842 | | | | | | | 18 | 9.66 | 153464.34 | 98035.34 | 129534.01 | 16209.25 |
| 843 | | | | | | 8 | 26 | 11 | 127176.32 | 100278.64 | 132999.94 | 16204.92 |
| 844 | | | | | 6 on 1 | | 18 | 8.33 | 133760.42 | 93185.77 | 87015.17 | 11389.61 |
| 845 | | | | | | 16 | 26 | 9.66 | 111569.74 | 89132.30 | 91025.60 | 11385.28 |
| 846 | | | | | | 24 | 26 | 8.33 | 98182.23 | 83858.98 | 61536.76 | 8573.45 |
| 847 | | | 0 | | | | 10 | 11 | 519992.94 | 458785.81 | 435815.62 | 201027.69 |
| 848 | | | | | | | 18 | 15 | 531804.56 | 479124.16 | 444769.81 | 204742.31 |
| 849 | | | | | | 8 | 26 | 19 | 563557.94 | 497296.25 | 470907.81 | 215427.80 |
| 850 | | | | | 2 on 1 | | 18 | 11 | 368475.94 | 359975.34 | 317635.56 | 142538.45 |
| 851 | | | | | | 16 | 26 | 15 | 378207.41 | 359707.22 | 323830.28 | 144504.92 |
| 852 | | | | | | 24 | 26 | 11 | 282718.00 | 292929.34 | 245776.67 | 108176.30 |
| 853 | 50000 | 3 | | | | | 10 | 10.5 | 129171.41 | 91811.28 | 104391.17 | 65241.52 |
| 854 | | | | | | | 18 | 12.5 | 122462.83 | 98213.87 | 107965.16 | 65655.98 |
| 855 | | | | | | 8 | 26 | 14.5 | 113542.44 | 83157.80 | 129080.69 | 65809.37 |
| 856 | | | | 10x12 | 4 on 1 | | 18 | 10.5 | 94242.92 | 79063.73 | 74161.96 | 46057.73 |
| 857 | | | | | | 16 | 26 | 12.5 | 87930.55 | 78928.59 | 88690.27 | 46211.12 |
| 858 | | | | | | 24 | 26 | 10.5 | 70995.17 | 67883.93 | 61605.05 | 34799.29 |
| 859 | | | | | | | 10 | 10.33 | 94766.31 | 52592.75 | 75800.23 | 16204.92 |
| 860 | | | | | | | 18 | 11.66 | 74691.63 | 51119.32 | 96260.62 | 16204.92 |
| 861 | | | | | | 8 | 26 | 13 | 68536.83 | 52271.96 | 96717.30 | 16204.92 |
| 862 | | | | | 6 on 1 | | 18 | 10.33 | 70333.52 | 48231.16 | 65750.47 | 11385.28 |
| 863 | | | | | | 16 | 26 | 11.66 | 58780.93 | 45909.83 | 66591.57 | 11385.28 |
| 864 | | | | | | 24 | 26 | 10.33 | 50841.92 | 41755.37 | 45008.07 | 8573.45 |
| 865 | | | | | | | 10 | 5 | 346686.69 | 285210.94 | 292192.50 | 133139.64 |
| 866 | | | | | | | 18 | 9 | 356037.00 | 293057.38 | 292819.75 | 136905.92 |
| 867 | | | 2 | 4x6 | 2 on 1 | 8 | 26 | 13 | 410737.44 | 337104.72 | 336867.28 | 156716.80 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **868** | | | | | | | **18** | 5 | 241882.77 | 223390.84 | 209874.06 | 92950.86 |
| **869** | | | | | **2 on 1** | **16** | **26** | 9 | 248731.09 | 210866.22 | 210270.16 | 107559.83 |
| **870** | | | | | | **24** | **26** | 5 | 182855.69 | 180054.52 | 161371.27 | 70430.23 |
| **871** | | | | | | | **10** | 4.5 | 89105.03 | 60622.89 | 66773.65 | 48066.98 |
| **872** | | | | | | | **18** | 6.5 | 84940.13 | 65878.44 | 70494.76 | 48952.10 |
| **873** | | | | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 79482.11 | 64756.84 | 90293.16 | 49658.18 |
| **874** | | | | | | **16** | **18** | 4.5 | 63625.36 | 50192.47 | 45826.46 | 33577.50 |
| **875** | | | | | | | **26** | 6.5 | 59042.37 | 45056.26 | 57137.57 | 34283.70 |
| **876** | | | | | | **24** | **26** | 4.5 | 46689.47 | 42136.20 | 39475.44 | 25449.19 |
| **877** | | | | | | | **10** | 4.33 | 63738.48 | 34797.29 | 45179.50 | 12061.29 |
| **878** | | | | | | | **18** | 5.66 | 54669.38 | 35196.17 | 62942.97 | 12234.76 |
| **879** | | | | | | **8** | **26** | 7 | 45611.33 | 37127.64 | 64756.62 | 12361.59 |
| **880** | **50000** | **3** | **2** | | **6 on 1** | | **18** | 4.33 | 45955.50 | 31667.82 | 38506.07 | 8449.26 |
| **881** | | | | | | **16** | **26** | 5.66 | 38198.00 | 31397.90 | 39693.09 | 8576.09 |
| **882** | | | | | | **24** | **26** | 4.33 | 32928.30 | 27824.80 | 26615.76 | 6400.34 |
| **883** | | | | | | | **10** | 9 | 374210.22 | 308856.69 | 300598.03 | 136905.92 |
| **884** | | | | | | | **18** | 13 | 427865.00 | 352994.75 | 343436.91 | 156716.80 |
| **885** | | | | | | **8** | **26** | 17 | 431449.53 | 364111.88 | 349930.03 | 165363.42 |
| **886** | | | | | **2 on 1** | | **18** | 9 | 261818.89 | 242295.48 | 215091.06 | 95895.48 |
| **887** | | | | | | **16** | **26** | 13 | 299688.59 | 258138.12 | 245172.11 | 109553.59 |
| **888** | | | | | | **24** | **26** | 9 | 197934.66 | 197525.20 | 165843.86 | 72622.09 |
| **889** | | | | | | | **10** | 8.5 | 130838.77 | 83265.45 | 84460.84 | 49658.18 |
| **890** | | | | | | | **18** | 10.5 | 119376.09 | 90353.30 | 85977.52 | 50173.44 |
| **891** | | | | | | **8** | **26** | 12.5 | 108857.51 | 70288.89 | 106085.74 | 50483.36 |
| **892** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 92005.66 | 72334.81 | 58302.63 | 34798.98 |
| **893** | | | | | | **16** | **26** | 10.5 | 83733.46 | 72085.14 | 70293.66 | 35108.91 |
| **894** | | | | | | **24** | **26** | 8.5 | 67232.23 | 61551.07 | 48781.25 | 26274.65 |
| **895** | | | | | | | **10** | 8.33 | 103271.71 | 53019.55 | 62443.12 | 12437.92 |
| **896** | | | | | | | **18** | 9.66 | 86057.53 | 52139.45 | 77301.02 | 12465.04 |
| **897** | | | | | **6 on 1** | **8** | **26** | 11 | 70878.55 | 54894.33 | 78327.35 | 12461.81 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 898 | | | | 8x10 | 6 on 1 | | 18 | 8.33 | 73762.16 | 49910.74 | 51930.33 | 8679.53 |
| 899 | | | | | | 16 | 26 | 9.66 | 60380.23 | 48026.11 | 51760.77 | 8676.31 |
| 900 | | | | | | 24 | 26 | 8.33 | 52190.61 | 44613.07 | 35401.00 | 6500.57 |
| 901 | | | | 10x12 | 2 on 1 | | 10 | 11 | 406036.66 | 344302.19 | 334383.41 | 155273.41 |
| 902 | | | | | | | 18 | 15 | 412000.53 | 352632.78 | 336339.31 | 157523.97 |
| 903 | | | | | | 8 | 26 | 19 | 435219.53 | 364970.56 | 352143.66 | 165617.69 |
| 904 | | | | | | | 18 | 11 | 283633.09 | 269983.41 | 239103.42 | 108783.26 |
| 905 | | | | | | 16 | 26 | 15 | 288840.75 | 255964.31 | 240898.31 | 110118.04 |
| 906 | | | | | | 24 | 26 | 11 | 215114.50 | 220336.09 | 185957.11 | 82146.27 |
| 907 | | | | | 4 on 1 | | 10 | 10.5 | 85317.55 | 58841.11 | 72139.43 | 50173.44 |
| 908 | | | | | | | 18 | 12.5 | 80836.48 | 62382.32 | 72348.62 | 50483.36 |
| 909 | | | | | | 8 | 26 | 14.5 | 74710.12 | 51341.18 | 90064.34 | 50589.38 |
| 910 | 50000 | 3 | 2 | | | | 18 | 10.5 | 60760.07 | 49770.98 | 48750.66 | 35108.91 |
| 911 | | | | | | 16 | 26 | 12.5 | 55747.86 | 48857.82 | 60381.69 | 35214.90 |
| 912 | | | | | | 24 | 26 | 10.5 | 43896.89 | 42090.50 | 42609.37 | 26380.65 |
| 913 | | | | | 6 on 1 | | 10 | 10.33 | 55598.58 | 29538.18 | 46853.00 | 12461.81 |
| 914 | | | | | | | 18 | 11.66 | 44393.38 | 29031.40 | 63968.23 | 12461.81 |
| 915 | | | | | | 8 | 26 | 13 | 39600.35 | 30463.12 | 63928.23 | 12461.81 |
| 916 | | | | | | | 18 | 10.33 | 39908.57 | 26996.22 | 42733.81 | 8676.31 |
| 917 | | | | | | 16 | 26 | 11.66 | 32630.95 | 25911.94 | 42668.36 | 8676.31 |
| 918 | | | | | | 24 | 26 | 10.33 | 27560.14 | 23152.29 | 28802.17 | 6500.57 |
| 919 | | | | 4x6 | 2 on 1 | | 10 | 5 | 758374.94 | 616494.56 | 643102.25 | 291069.09 |
| 920 | | | | | | | 18 | 9 | 774654.62 | 622716.06 | 645132.31 | 297552.53 |
| 921 | | | | | | 8 | 26 | 13 | 892251.88 | 707644.75 | 734905.06 | 339845.38 |
| 922 | | | | | | | 18 | 5 | 507647.84 | 468601.47 | 449177.59 | 194775.70 |
| 923 | | | | | | 16 | 26 | 9 | 517166.56 | 430533.88 | 448434.56 | 224859.22 |
| 924 | | | 4 | | | 24 | 26 | 5 | 374963.81 | 369622.75 | 340885.94 | 144653.17 |
| 925 | | | | | 4 on 1 | | 10 | 4.5 | 175020.22 | 109936.67 | 137534.94 | 105038.23 |
| 926 | | | | | | | 18 | 6.5 | 154226.00 | 114046.75 | 137183.19 | 106341.82 |
| 927 | | | | | | 8 | 26 | 8.5 | 147424.72 | 118812.78 | 189558.86 | 107551.80 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 928 | | | | | | | 18 | 4.5 | 110247.20 | 89176.34 | 89203.01 | 70184.40 |
| 929 | | | | | 4 on 1 | 16 | 26 | 6.5 | 105687.71 | 81909.65 | 121637.91 | 71621.38 |
| 930 | | | | | | 24 | 26 | 4.5 | 82035.20 | 73935.04 | 81353.43 | 52391.86 |
| 931 | | | | 4x6 | | | 10 | 4.33 | 109744.48 | 53255.44 | 80603.04 | 26224.27 |
| 932 | | | | | | | 18 | 5.66 | 82583.49 | 53301.78 | 130936.17 | 26589.75 |
| 933 | | | | | | 8 | 26 | 7 | 72255.62 | 59679.77 | 134098.06 | 26837.34 |
| 934 | | | | | 6 on 1 | | 18 | 4.33 | 67577.89 | 47339.02 | 79467.16 | 17668.23 |
| 935 | | | | | | 16 | 26 | 5.66 | 58909.76 | 48641.30 | 83139.41 | 17907.26 |
| 936 | | | | | | 24 | 26 | 4.33 | 50329.02 | 42538.22 | 52833.76 | 13141.85 |
| 937 | | | | | | | 10 | 9 | 807210.31 | 643220.81 | 651365.31 | 297552.53 |
| 938 | | | | | | | 18 | 13 | 916364.31 | 736024.12 | 741468.81 | 339845.38 |
| 939 | | | | | | 8 | 26 | 17 | 939416.00 | 767533.75 | 770683.12 | 358441.31 |
| 940 | | | | | 2 on 1 | | 18 | 9 | 535549.50 | 492023.78 | 451357.73 | 200472.94 |
| 941 | | | | | | 16 | 26 | 13 | 614288.44 | 517239.81 | 515895.69 | 228502.97 |
| 942 | 50000 | 3 | 4 | | | 24 | 26 | 9 | 397228.81 | 395769.78 | 344361.88 | 149084.19 |
| 943 | | | | | | | 10 | 8.5 | 234081.98 | 140923.17 | 149421.11 | 107851.80 |
| 944 | | | | | | | 18 | 10.5 | 200727.17 | 149235.61 | 150309.61 | 108827.59 |
| 945 | | | | | | 8 | 26 | 12.5 | 190903.98 | 123856.03 | 206789.48 | 109422.65 |
| 946 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 148746.00 | 120599.23 | 101652.09 | 72564.51 |
| 947 | | | | | | 16 | 26 | 10.5 | 142254.22 | 120371.00 | 137346.88 | 73159.55 |
| 948 | | | | | | 24 | 26 | 8.5 | 113077.82 | 102708.77 | 95867.52 | 53882.04 |
| 949 | | | | | | | 10 | 8.33 | 171838.16 | 84595.79 | 98112.22 | 26985.53 |
| 950 | | | | | | | 18 | 9.66 | 133334.30 | 84119.57 | 151084.08 | 27051.24 |
| 951 | | | | | | 8 | 26 | 11 | 114721.52 | 94478.80 | 152873.73 | 27043.74 |
| 952 | | | | | 6 on 1 | | 18 | 8.33 | 111986.22 | 78387.16 | 98162.09 | 18120.73 |
| 953 | | | | | | 16 | 26 | 9.66 | 95571.86 | 79212.29 | 100731.59 | 18113.24 |
| 954 | | | | | | 24 | 26 | 8.33 | 82125.77 | 71001.66 | 70139.38 | 13333.85 |
| 955 | | | | | | | 10 | 11 | 884691.56 | 727139.81 | 730929.12 | 336687.56 |
| 956 | | | | | | | 18 | 15 | 892465.94 | 746783.50 | 732911.31 | 341615.09 |
| 957 | | | | 10x12 | 2 on 1 | 8 | 26 | 19 | 945021.31 | 771203.88 | 771398.06 | 359171.09 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing **Acc. Cost ($)** | **Culvert Extension** **Acc. Cost ($)** | **Guardrail Installation** **Acc. Cost ($)** | Grating **Acc. Cost ($)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 958 | | | | | | | 18 | 11 | 591367.19 | 555963.44 | 508827.19 | 226942.05 |
| 959 | | | | | 2 on 1 | 16 | 26 | 15 | 603085.69 | 520409.88 | 513777.72 | 229541.23 |
| 960 | | | | | | 24 | 26 | 11 | 441548.53 | 445899.44 | 390484.81 | 168614.95 |
| 961 | | | | | | | 10 | 10.5 | 163131.08 | 114265.91 | 143016.62 | 108827.59 |
| 962 | | | | | | | 18 | 12.5 | 152083.36 | 118167.46 | 144062.50 | 109422.65 |
| 963 | | | | | | 8 | 26 | 14.5 | 146065.27 | 100006.98 | 201551.80 | 109690.54 |
| 964 | 50000 | 3 | 4 | 10x12 | 4 on 1 | | 18 | 10.5 | 109521.39 | 92707.92 | 97452.74 | 73159.55 |
| 965 | | | | | | 16 | 26 | 12.5 | 104920.14 | 90990.60 | 131220.30 | 73428.23 |
| 966 | | | | | | 24 | 26 | 10.5 | 81525.82 | 78727.18 | 92690.60 | 54114.46 |
| 967 | | | | | | | 10 | 10.33 | 99198.58 | 51966.38 | 87953.66 | 27043.74 |
| 968 | | | | | | | 18 | 11.66 | 72385.40 | 51387.47 | 144517.70 | 27043.74 |
| 969 | | | | | | 8 | 26 | 13 | 71110.20 | 56447.43 | 145579.47 | 27043.74 |
| 970 | | | | | 6 on 1 | | 18 | 10.33 | 64828.21 | 45977.98 | 93766.77 | 18113.24 |
| 971 | | | | | | 16 | 26 | 11.66 | 57010.75 | 45965.97 | 94987.34 | 18113.24 |
| 972 | | | | | | 24 | 26 | 10.33 | 47527.66 | 39442.31 | 65445.01 | 13333.85 |
| 973 | | | | | | | 10 | 5 | 671209.12 | 562744.44 | 567149.12 | 257941.42 |
| 974 | | | | | | | 18 | 9 | 699878.81 | 590976.31 | 588781.81 | 267511.44 |
| 975 | | | | | | 8 | 26 | 13 | 806123.12 | 689497.56 | 678140.25 | 308037.78 |
| 976 | | | | | 2 on 1 | | 18 | 5 | 471250.25 | 433621.94 | 412654.06 | 180520.67 |
| 977 | | | | | | 16 | 26 | 9 | 489559.38 | 432528.72 | 421870.62 | 212630.72 |
| 978 | | | | | | 24 | 26 | 5 | 360213.97 | 353193.66 | 317594.81 | 138392.95 |
| 979 | | | | | | | 10 | 4.5 | 208335.84 | 131620.88 | 144938.88 | 93377.56 |
| 980 | | | | | | | 18 | 6.5 | 198830.33 | 146931.33 | 158779.94 | 95625.15 |
| 981 | 100000 | 0 | 0 | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 180951.94 | 141989.70 | 193021.83 | 97511.41 |
| 982 | | | | | | 16 | 18 | 4.5 | 149437.08 | 110399.18 | 98874.46 | 65407.46 |
| 983 | | | | | | | 26 | 6.5 | 138430.00 | 98661.88 | 124399.13 | 67294.16 |
| 984 | | | | | | 24 | 26 | 4.5 | 110280.88 | 95684.82 | 82259.45 | 50253.28 |
| 985 | | | | | | | 10 | 4.33 | 162084.61 | 85629.02 | 104089.06 | 23557.33 |
| 986 | | | | | | | 18 | 5.66 | 139758.73 | 87650.05 | 139246.81 | 24020.20 |
| 987 | | | | | 6 on 1 | 8 | 26 | 7 | 118023.44 | 93385.15 | 149253.31 | 24335.39 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 988 | | | | | | | 18 | 4.33 | 118976.26 | 79421.74 | 85121.46 | 16587.24 |
| 989 | | | | 4x6 | 6 on 1 | 16 | 26 | 5.66 | 101805.80 | 79908.45 | 96220.51 | 16902.45 |
| 990 | | | | | | 24 | 26 | 4.33 | 89122.24 | 72025.82 | 62577.36 | 12703.31 |
| 991 | | | | | | | 10 | 9 | 754718.75 | 620520.94 | 604352.88 | 267511.44 |
| 992 | | | | | | | 18 | 13 | 859941.31 | 723260.38 | 699422.69 | 308037.78 |
| 993 | | | | | | 8 | 26 | 17 | 845457.25 | 754695.69 | 711307.31 | 325510.34 |
| 994 | | | | | 2 on 1 | | 18 | 9 | 528012.94 | 486396.00 | 430344.16 | 188668.33 |
| 995 | | | | | | 16 | 26 | 13 | 602978.81 | 542296.56 | 502643.02 | 215873.83 |
| 996 | | | | | | 24 | 26 | 9 | 402804.19 | 398372.16 | 335631.38 | 144089.66 |
| 997 | | | | | | | 10 | 8.5 | 317868.38 | 199793.47 | 193135.45 | 97511.41 |
| 998 | | | | | | | 18 | 10.5 | 289654.38 | 224035.92 | 210215.00 | 98792.60 |
| 999 | | | | | | 8 | 26 | 12.5 | 261402.94 | 124194.08 | 248582.42 | 99376.71 |
| 1000 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 226899.03 | 177285.31 | 136606.41 | 68575.43 |
| 1001 | | | | | | 16 | 26 | 10.5 | 208243.11 | 184548.00 | 166664.53 | 69159.55 |
| 1002 | 100000 | 0 | 0 | | | 24 | 26 | 8.5 | 170985.06 | 155785.09 | 114343.76 | 52119.01 |
| 1003 | | | | | | | 10 | 8.33 | 269433.69 | 147622.52 | 159723.55 | 24480.07 |
| 1004 | | | | | | | 18 | 9.66 | 230267.30 | 146498.70 | 194823.47 | 24532.95 |
| 1005 | | | | | | 8 | 26 | 11 | 189860.38 | 150198.70 | 199717.80 | 24527.00 |
| 1006 | | | | | 6 on 1 | | 18 | 8.33 | 200394.55 | 138507.31 | 130032.07 | 17100.00 |
| 1007 | | | | | | 16 | 26 | 9.66 | 166311.38 | 132224.17 | 135971.78 | 17094.04 |
| 1008 | | | | | | 24 | 26 | 8.33 | 146245.17 | 124655.84 | 91654.89 | 12894.92 |
| 1009 | | | | | | | 10 | 11 | 788058.94 | 695413.19 | 663567.44 | 304597.38 |
| 1010 | | | | | | | 18 | 15 | 805777.75 | 725627.50 | 674450.44 | 310040.88 |
| 1011 | | | | | | 8 | 26 | 19 | 853691.06 | 753485.75 | 713922.19 | 326026.09 |
| 1012 | | | | 10x12 | 2 on 1 | | 18 | 11 | 553921.19 | 541868.25 | 477685.12 | 214185.48 |
| 1013 | | | | | | 16 | 26 | 15 | 568387.62 | 541310.94 | 486950.47 | 216961.44 |
| 1014 | | | | | | 24 | 26 | 11 | 425792.12 | 442077.59 | 370992.16 | 162779.48 |
| 1015 | | | | | | | 10 | 10.5 | 195103.22 | 138388.98 | 157762.39 | 98792.60 |
| 1016 | | | | | | | 18 | 12.5 | 184773.14 | 148202.86 | 163232.25 | 99376.71 |
| 1017 | | | | | 4 on 1 | 8 | 26 | 14.5 | 170742.64 | 125434.42 | 195089.28 | 99587.96 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1018** | | | | | | | **18** | 10.5 | 141515.69 | 118643.66 | 111301.12 | 69159.55 |
| **1019** | | | | | **4 on 1** | **16** | **26** | 12.5 | 131620.58 | 117915.71 | 133100.41 | 69370.74 |
| **1020** | | | | | | **24** | **26** | 10.5 | 106365.99 | 101861.27 | 92556.14 | 52330.24 |
| **1021** | | | **0** | **10x12** | | | **10** | 10.33 | 142686.53 | 78427.73 | 114337.80 | 24527.00 |
| **1022** | | | | | | | **18** | 11.66 | 112397.26 | 76562.01 | 145322.66 | 24527.00 |
| **1023** | | | | | | **8** | **26** | 13 | 102389.62 | 78331.48 | 145880.28 | 24527.00 |
| **1024** | | | | | **6 on 1** | | **18** | 10.33 | 105331.27 | 72222.34 | 98487.49 | 17094.04 |
| **1025** | | | | | | **16** | **26** | 11.66 | 87545.39 | 68757.59 | 99694.99 | 17094.04 |
| **1026** | | | | | | **24** | **26** | 10.33 | 75618.95 | 61999.58 | 67216.12 | 12894.92 |
| **1027** | | | | | | | **10** | 5 | 526377.56 | 433362.03 | 444998.62 | 202143.98 |
| **1028** | | | | | | | **18** | 9 | 540314.19 | 445022.53 | 449249.69 | 207831.34 |
| **1029** | | | | | | **8** | **26** | 13 | 623397.50 | 511524.44 | 313341.12 | 237861.00 |
| **1030** | | | | | **2 on 1** | | **18** | 5 | 363449.00 | 337117.00 | 316641.22 | 139735.67 |
| **1031** | | | | | | **16** | **26** | 9 | 373762.50 | 318306.81 | 318364.97 | 161714.30 |
| **1032** | **100000** | **0** | | | | **24** | **26** | 5 | 275207.44 | 271619.62 | 243973.81 | 106049.04 |
| **1033** | | | | | | | **10** | 4.5 | 134041.61 | 91690.48 | 101764.59 | 72974.27 |
| **1034** | | | | | | | **18** | 6.5 | 127583.01 | 99412.91 | 107236.64 | 74305.90 |
| **1035** | | | **2** | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 119417.78 | 97777.75 | 137397.73 | 75369.90 |
| **1036** | | | | | | **16** | **18** | 4.5 | 94903.72 | 75546.91 | 69855.65 | 50469.60 |
| **1037** | | | | | | | **26** | 6.5 | 88128.49 | 67565.08 | 86150.15 | 51533.82 |
| **1038** | | | | | | **24** | **26** | 4.5 | 69763.13 | 63360.29 | 59644.43 | 38311.83 |
| **1039** | | | | | | | **10** | 4.33 | 95298.26 | 52129.80 | 68637.26 | 18313.29 |
| **1040** | | | | | | | **18** | 5.66 | 81451.19 | 52714.63 | 95796.24 | 18574.96 |
| **1041** | | | | | | **8** | **26** | 7 | 67840.38 | 55771.77 | 98291.52 | 18763.07 |
| **1042** | | | | | **6 on 1** | | **18** | 4.33 | 68265.62 | 47367.73 | 58039.32 | 12704.80 |
| **1043** | | | | | | **16** | **26** | 5.66 | 56619.61 | 47021.83 | 59736.87 | 12892.91 |
| **1044** | | | | | | **24** | **26** | 4.33 | 48828.85 | 41860.98 | 39831.83 | 9635.97 |
| **1045** | | | | | | | **10** | 9 | 567684.38 | 468726.97 | 458116.16 | 207831.34 |
| **1046** | | | | | | | **18** | 13 | 649058.81 | 535375.44 | 523345.97 | 237861.00 |
| **1047** | | | | **8x10** | **2 on 1** | **8** | **26** | 17 | 655867.31 | 555130.19 | 532928.38 | 250853.80 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1048** | | | | | | | **18** | 9 | 393247.03 | 365534.03 | 324153.38 | 144176.41 |
| **1049** | | | | | **2 on 1** | **16** | **26** | 13 | 450313.19 | 388865.97 | 369472.81 | 164637.83 |
| **1050** | | | | | | **24** | **26** | 9 | 297791.88 | 297607.25 | 250749.44 | 109310.65 |
| **1051** | | | | | | | **10** | 8.5 | 196530.42 | 125011.08 | 128651.45 | 75369.90 |
| **1052** | | | | | | | **18** | 10.5 | 178688.06 | 135958.00 | 130299.70 | 76134.98 |
| **1053** | | | | | | **8** | **26** | 12.5 | 162804.06 | 105831.35 | 158591.25 | 76576.09 |
| **1054** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 136970.17 | 108087.12 | 86704.88 | 52298.92 |
| **1055** | | | | | | **16** | **26** | 10.5 | 124572.62 | 107959.70 | 104410.84 | 52740.03 |
| **1056** | | | | | | **24** | **26** | 8.5 | 100077.10 | 91684.77 | 73235.54 | 39518.46 |
| **1057** | | | | | | | **10** | 8.33 | 154200.72 | 79476.05 | 94346.50 | 18871.49 |
| **1058** | | | | | | | **18** | 9.66 | 230267.30 | 146498.70 | 194823.47 | 24532.95 |
| **1059** | | | | | | **8** | **26** | 11 | 189860.38 | 150198.70 | 199717.80 | 24527.00 |
| **1060** | | | | | **6 on 1** | | **18** | 8.33 | 109434.86 | 74350.33 | 77883.03 | 13038.66 |
| **1061** | | | | | | **16** | **26** | 9.66 | 89525.19 | 71880.38 | 77524.30 | 13034.22 |
| **1062** | **100000** | **0** | **2** | | | **24** | **26** | 8.33 | 77297.06 | 66559.28 | 53041.41 | 9777.30 |
| **1063** | | | | | | | **10** | 11 | 616367.62 | 523367.25 | 509542.03 | 235705.45 |
| **1064** | | | | | | | **18** | 15 | 625405.88 | 534934.25 | 512636.00 | 239040.64 |
| **1065** | | | | | | **8** | **26** | 19 | 660678.38 | 554858.19 | 536583.19 | 251203.84 |
| **1066** | | | | | **2 on 1** | | **18** | 11 | 426402.38 | 407230.47 | 360644.06 | 163522.30 |
| **1067** | | | | | | **16** | **26** | 15 | 434214.75 | 385498.59 | 363796.62 | 165412.86 |
| **1068** | | | | | | **24** | **26** | 11 | 323154.53 | 332235.00 | 281101.75 | 123580.76 |
| **1069** | | | | | | | **10** | 10.5 | 128368.72 | 89197.70 | 109746.23 | 76134.98 |
| **1070** | | | | | | | **18** | 12.5 | 121487.07 | 94471.48 | 109849.73 | 76576.09 |
| **1071** | | | | | | **8** | **26** | 14.5 | 112370.85 | 77614.70 | 136723.09 | 76722.09 |
| **1072** | | | | **10x12** | **4 on 1** | | **18** | 10.5 | 90661.30 | 74969.29 | 739985.08 | 52740.03 |
| **1073** | | | | | | **16** | **26** | 12.5 | 83246.59 | 73494.61 | 90939.46 | 52886.03 |
| **1074** | | | | | | **24** | **26** | 10.5 | 65582.23 | 63228.77 | 64387.75 | 39664.43 |
| **1075** | | | | | | | **10** | 10.33 | 83113.11 | 44541.65 | 71084.93 | 18904.38 |
| **1076** | | | | | | | **18** | 11.66 | 66152.41 | 43603.38 | 96442.41 | 18904.38 |
| **1077** | | | | | **6 on 1** | **8** | **26** | 13 | 59042.32 | 45742.01 | 96944.63 | 18904.38 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1078** | | | **2** | **10x12** | **6 on 1** | | **18** | 10.33 | 59270.58 | 40362.42 | 64283.33 | 13034.22 |
| **1079** | | | | | | **16** | **26** | 11.66 | 48384.00 | 38736.07 | 64161.72 | 13034.22 |
| **1080** | | | | | | **24** | **26** | 10.33 | 40792.50 | 34418.59 | 43277.62 | 9777.30 |
| **1081** | | | | | | | **10** | 5 | 1149668.25 | 936415.44 | 979579.62 | 441381.72 |
| **1082** | | | | | | | **18** | 9 | 1174263.12 | 942839.00 | 986738.25 | 451192.47 |
| **1083** | | | | | | **8** | **26** | 13 | 1352985.88 | 1071340.75 | 1120307.88 | 515222.53 |
| **1084** | | | | | **2 on 1** | | **18** | 5 | 761307.19 | 703856.75 | 676041.38 | 292218.12 |
| **1085** | | | | | | **16** | **26** | 9 | 775752.62 | 647866.25 | 675646.94 | 337414.62 |
| **1086** | | | | | | **24** | **26** | 5 | 563989.56 | 556506.06 | 514807.91 | 217699.56 |
| **1087** | | | | | | | **10** | 4.5 | 262715.72 | 166732.89 | 205957.03 | 159243.64 |
| **1088** | | | | | | | **18** | 6.5 | 231697.12 | 172870.14 | 207740.84 | 161217.42 |
| **1089** | | | | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 222323.91 | 180185.03 | 289200.16 | 163511.41 |
| **1090** | | | | | | **16** | **18** | 4.5 | 164109.53 | 134404.00 | 134389.64 | 105280.80 |
| **1091** | | | | | | | **26** | 6.5 | 158169.84 | 123624.91 | 183621.69 | 107470.18 |
| **1092** | **100000** | **0** | **4** | | | **24** | **26** | 4.5 | 123017.56 | 111903.02 | 122778.28 | 78842.02 |
| **1093** | | | | | | | **10** | 4.33 | 163454.22 | 80696.02 | 122819.18 | 39767.70 |
| **1094** | | | | | | | **18** | 5.66 | 123257.66 | 80575.24 | 199848.91 | 40322.68 |
| **1095** | | | | | | **8** | **26** | 7 | 108331.52 | 90218.43 | 205193.56 | 40688.95 |
| **1096** | | | | | **6 on 1** | | **18** | 4.33 | 100415.57 | 71422.66 | 120951.27 | 26518.28 |
| **1097** | | | | | | **16** | **26** | 5.66 | 87985.48 | 73126.46 | 125594.32 | 26872.12 |
| **1098** | | | | | | **24** | **26** | 4.33 | 75231.14 | 64520.52 | 80852.45 | 19772.41 |
| **1099** | | | | | | | **10** | 9 | 1223227.25 | 975985.00 | 994156.75 | 451192.47 |
| **1100** | | | | | | | **18** | 13 | 1389238.00 | 1115720.88 | 1129202.88 | 515222.53 |
| **1101** | | | | | | **8** | **26** | 17 | 1424809.25 | 1162289.62 | 1174288.75 | 643179.25 |
| **1102** | | | | **8x10** | **2 on 1** | | **18** | 9 | 803107.06 | 741767.25 | 679713.25 | 300820.56 |
| **1103** | | | | | | **16** | **26** | 13 | 922084.44 | 778828.50 | 777731.94 | 342784.12 |
| **1104** | | | | | | **24** | **26** | 9 | 597819.62 | 595784.38 | 519766.66 | 22487.81 |
| **1105** | | | | | | | **10** | 8.5 | 351711.88 | 215465.91 | 227944.48 | 163511.41 |
| **1106** | | | | | | | **18** | 10.5 | 301816.72 | 227881.42 | 229234.52 | 164958.77 |
| **1107** | | | | | **4 on 1** | **8** | **26** | 12.5 | 287742.56 | 187612.36 | 315087.19 | 165801.62 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1108** | | | | | | | **18** | 8.5 | 222150.83 | 181565.92 | 153041.30 | 108870.03 |
| **1109** | | | | **8x10** | **4 on 1** | **16** | **26** | 10.5 | 213191.30 | 181586.56 | 207295.42 | 109713.08 |
| **1110** | | | | | | **24** | **26** | 8.5 | 169706.22 | 154935.48 | 144613.39 | 81008.59 |
| **1111** | | | | | | | **10** | 8.33 | 257111.73 | 127609.75 | 149802.77 | 40898.64 |
| **1112** | | | | | | | **18** | 9.66 | 199333.61 | 126854.15 | 230437.98 | 40989.12 |
| **1113** | | | | | | **8** | **26** | 11 | 172155.23 | 141642.14 | 233015.05 | 40978.81 |
| **1114** | | | | | **6 on 1** | | **18** | 8.33 | 166868.25 | 117832.68 | 148285.55 | 27171.74 |
| **1115** | | | | | | **16** | **26** | 9.66 | 142967.12 | 118957.98 | 152193.77 | 27161.42 |
| **1116** | | | | | | **24** | **26** | 8.33 | 122751.25 | 106668.40 | 105861.09 | 20041.27 |
| **1117** | | | | | | | **10** | 11 | 1341552.00 | 1105019.62 | 1113492.12 | 510608.41 |
| **1118** | | | | | | | **18** | 15 | 1353056.62 | 1130008.75 | 1116394.38 | 517836.28 |
| **1119** | | | | | | **8** | **26** | 19 | 1433064.12 | 1166497.75 | 1174596.38 | 544184.31 |
| **1120** | **100000** | **0** | **4** | | **2 on 1** | | **18** | 11 | 887191.56 | 836698.69 | 766335.19 | 340529.41 |
| **1121** | | | | | | **16** | **26** | 15 | 904734.50 | 781335.06 | 773535.06 | 344205.06 |
| **1122** | | | | | | **24** | **26** | 11 | 664085.06 | 671808.88 | 589395.31 | 253529.36 |
| **1123** | | | | | | | **10** | 10.5 | 245677.33 | 173452.34 | 218009.61 | 164958.77 |
| **1124** | | | | | | | **18** | 12.5 | 229277.02 | 179402.80 | 219372.38 | 165801.62 |
| **1125** | | | | | | **8** | **26** | 14.5 | 220547.39 | 151322.62 | 307131.25 | 166170.50 |
| **1126** | | | | **10x12** | **4 on1** | | **18** | 10.5 | 163771.52 | 139518.78 | 146843.11 | 109713.08 |
| **1127** | | | | | | **16** | **26** | 12.5 | 157203.22 | 137368.84 | 197958.45 | 110083.06 |
| **1128** | | | | | | **24** | **26** | 10.5 | 122354.20 | 118562.85 | 140011.33 | 81328.63 |
| **1129** | | | | | | | **10** | 10.33 | 148419.64 | 78250.53 | 133496.36 | 40978.81 |
| **1130** | | | | | | | **18** | 11.66 | 108329.73 | 77396.94 | 220543.94 | 40978.81 |
| **1131** | | | | | | **8** | **26** | 13 | 106722.48 | 85104.79 | 222037.94 | 40978.81 |
| **1132** | | | | | **6 on 1** | | **18** | 10.33 | 96581.44 | 68904.30 | 141713.44 | 27161.42 |
| **1133** | | | | | | **16** | **26** | 11.66 | 85051.99 | 68844.76 | 143392.03 | 27161.42 |
| **1134** | | | | | | **24** | **26** | 10.33 | 70821.65 | 59171.60 | 98224.38 | 20041.27 |
| **1135** | | | | | | | **10** | 5 | 1407872.00 | 1180365.50 | 1189604.50 | 541036.31 |
| **1136** | | | | | | | **18** | 9 | 1468007.12 | 1239582.25 | 1234979.38 | 561109.50 |
| **1137** | | **3** | **0** | **4x6** | **2 on 1** | **8** | **26** | 13 | 1690856.25 | 1446232.25 | 1422410.12 | 646114.19 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope **Steepness** | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1138 | | | | | | | 18 | 5 | 988455.00 | 909529.00 | 865548.56 | 378645.03 |
| 1139 | | | | | 2 on 1 | 16 | 26 | 9 | 1026858.69 | 905117.50 | 884880.44 | 443898.84 |
| 1140 | | | | | | 24 | 26 | 5 | 755554.62 | 740829.38 | 666160.19 | 290281.47 |
| 1141 | | | | | | | 10 | 4.5 | 436987.78 | 276076.91 | 304011.62 | 195860.94 |
| 1142 | | | | | | | 18 | 6.5 | 417049.81 | 308190.81 | 333043.47 | 200575.28 |
| 1143 | | | | 4x6 | 4 on 1 | 8 | 26 | 8.5 | 379549.59 | 297825.69 | 404866.41 | 204531.77 |
| 1144 | | | | | | 16 | 18 | 4.5 | 313446.69 | 231564.06 | 207390.78 | 137193.22 |
| 1145 | | | | | | | 26 | 6.5 | 290359.16 | 206944.89 | 260929.17 | 141150.59 |
| 1146 | | | | | | 24 | 26 | 4.5 | 231315.92 | 200700.44 | 172540.53 | 105407.05 |
| 1147 | | | | | | | 10 | 4.33 | 339975.06 | 179608.25 | 218328.48 | 49411.88 |
| 1148 | | | | | | | 18 | 5.66 | 293146.22 | 183847.41 | 292072.44 | 50382.76 |
| 1149 | | | | | | 8 | 26 | 7 | 247556.06 | 195876.84 | 313061.25 | 51043.88 |
| 1150 | | | | | 6 on 1 | | 18 | 4.33 | 249554.61 | 166588.38 | 178543.64 | 34792.00 |
| 1151 | | | | | | 16 | 26 | 5.66 | 213539.31 | 167609.27 | 201824.06 | 35453.16 |
| 1152 | **100000** | 3 | 0 | | | 24 | 26 | 4.33 | 186935.34 | 151075.31 | 131257.00 | 26645.40 |
| 1153 | | | | | | | 10 | 9 | 1583034.75 | 1301552.75 | 1267639.88 | 561109.50 |
| 1154 | | | | | | | 18 | 13 | 1803740.75 | 1517050.38 | 1467050.38 | 646114.19 |
| 1155 | | | | | | 8 | 26 | 17 | 1773360.25 | 1582986.25 | 1491978.62 | 682763.19 |
| 1156 | | | | | 2 on 1 | | 18 | 9 | 1107515.62 | 1020223.44 | 902653.81 | 395734.84 |
| 1157 | | | | | | 16 | 26 | 13 | 1264757.75 | 1137475.75 | 1054301.88 | 452798.84 |
| 1158 | | | | | | 24 | 26 | 9 | 844888.31 | 835592.00 | 703992.25 | 302230.38 |
| 1159 | | | | | | | 10 | 8.5 | 666734.06 | 419070.03 | 405104.72 | 204531.77 |
| 1160 | | | | | | | 18 | 10.5 | 607554.75 | 469918.97 | 440929.34 | 207219.06 |
| 1161 | | | | | | 8 | 26 | 12.5 | 548296.88 | 260499.08 | 521405.66 | 208444.25 |
| 1162 | | | | 8x10 | 4 on 1 | | 18 | 8.5 | 475924.38 | 371858.81 | 286534.16 | 143838.06 |
| 1163 | | | | | | 16 | 26 | 10.5 | 436793.28 | 387092.38 | 349581.53 | 145063.28 |
| 1164 | | | | | | 24 | 26 | 8.5 | 358643.91 | 326761.72 | 239837.88 | 109320.46 |
| 1165 | | | | | | | 10 | 8.33 | 565141.50 | 309640.59 | 335022.72 | 51347.34 |
| 1166 | | | | | | | 18 | 9.66 | 482989.38 | 307283.38 | 408645.38 | 51458.27 |
| 1167 | | | | | 6 on 1 | 8 | 26 | 11 | 398235.22 | 315044.22 | 418911.31 | 51445.78 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1168** | | | | **8x10** | **6 on 1** | | **18** | 8.33 | 420330.78 | 290521.34 | 272744.38 | 35867.53 |
| **1169** | | | | | | **16** | **26** | 9.66 | 348840.81 | 277342.34 | 285203.00 | 35855.03 |
| **1170** | | | | | | **24** | **26** | 8.33 | 306751.59 | 261467.64 | 192247.61 | 27047.30 |
| **1171** | | | | **10x12** | **2 on 1** | | **10** | 11 | 1652966.38 | 1458640.38 | 1391843.38 | 638897.88 |
| **1172** | | | | | | | **18** | 15 | 1690131.75 | 1522015.25 | 1414670.62 | 650315.75 |
| **1173** | | | | | | **8** | **26** | 19 | 1790630.75 | 1580448.50 | 1497463.38 | 683845.00 |
| **1174** | | | | | | | **18** | 11 | 1161858.62 | 1136577.38 | 1001952.25 | 449257.50 |
| **1175** | | | | | | **16** | **26** | 15 | 1192202.25 | 1135408.50 | 1021386.44 | 455080.12 |
| **1176** | | | | | | **24** | **26** | 11 | 893105.81 | 927264.88 | 778162.06 | 341432.59 |
| **1177** | | | | | **4 on 1** | | **10** | 10.5 | 409232.12 | 290273.12 | 330909.16 | 207219.06 |
| **1178** | | | | | | | **18** | 12.5 | 387564.62 | 310857.88 | 342382.25 | 208444.25 |
| **1179** | | | | | | **8** | **26** | 14.5 | 358135.44 | 263100.72 | 409202.91 | 208887.34 |
| **1180** | **100000** | **3** | **0** | | | | **18** | 10.5 | 296831.41 | 248857.00 | 233455.88 | 145063.28 |
| **1181** | | | | | | **16** | **26** | 12.5 | 276076.28 | 247330.09 | 279180.25 | 145506.25 |
| **1182** | | | | | | **24** | **26** | 10.5 | 223104.39 | 213655.64 | 194137.98 | 109763.52 |
| **1183** | | | | | **6 on 1** | | **10** | 10.33 | 299287.28 | 164503.41 | 239825.38 | 51445.78 |
| **1184** | | | | | | | **18** | 11.66 | 235755.06 | 160590.05 | 304816.62 | 51445.78 |
| **1185** | | | | | | **8** | **26** | 13 | 214763.88 | 164301.53 | 305986.25 | 51445.78 |
| **1186** | | | | | | | **18** | 10.33 | 220934.02 | 151487.52 | 206579.09 | 35855.03 |
| **1187** | | | | | | **16** | **26** | 11.66 | 183627.88 | 144220.16 | 209111.86 | 35855.03 |
| **1188** | | | | | | **24** | **26** | 10.33 | 158611.97 | 130045.12 | 140986.91 | 27047.30 |
| **1189** | | | | **4x6** | **2 on 1** | | **10** | 5 | 1104085.50 | 908983.81 | 933391.81 | 424000.28 |
| **1190** | | | | | | | **18** | 9 | 1133317.62 | 933441.94 | 942308.44 | 435929.59 |
| **1191** | | | | | | **8** | **26** | 13 | 1307586.25 | 1072930.75 | 1076741.25 | 498917.28 |
| **1192** | | | **2** | | | | **18** | 5 | 762340.12 | 707108.31 | 664160.06 | 293097.81 |
| **1193** | | | | | | **16** | **26** | 9 | 783972.88 | 667653.69 | 667775.62 | 339198.34 |
| **1194** | | | | | | **24** | **26** | 5 | 577252.00 | 569726.56 | 511739.00 | 222439.56 |
| **1195** | | | | | **4 on 1** | | **10** | 4.5 | 281154.44 | 192322.27 | 213452.86 | 153064.70 |
| **1196** | | | | | | | **18** | 6.5 | 267607.41 | 208520.19 | 224930.58 | 155857.83 |
| **1197** | | | | | | **8** | **26** | 8.5 | 250480.72 | 205090.41 | 288193.97 | 158089.58 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1198** | | | | | | **16** | **18** | 4.5 | 199062.08 | 158460.84 | 146523.34 | 105860.80 |
| **1199** | | | | | **4 on 1** | | **26** | 6.5 | 184850.94 | 141718.84 | 180701.33 | 108093.01 |
| **1200** | | | | | | **24** | **26** | 4.5 | 146329.30 | 132899.23 | 125105.16 | 80359.67 |
| **1201** | | | | **4x6** | | | **10** | 4.33 | 199889.64 | 109343.10 | 143967.77 | 38412.43 |
| **1202** | | | | | | | **18** | 5.66 | 170845.17 | 110569.78 | 200934.16 | 38961.28 |
| **1203** | | | | | | **8** | **26** | 7 | 142296.30 | 116982.17 | 206168.05 | 39355.85 |
| **1204** | | | | | **6 on 1** | | **18** | 4.33 | 143188.23 | 99354.57 | 121738.42 | 26648.51 |
| **1205** | | | | | | **16** | **26** | 5.66 | 118760.53 | 98629.05 | 125299.05 | 27043.08 |
| **1206** | | | | | | **24** | **26** | 4.33 | 102419.30 | 87804.08 | 83547.91 | 20211.60 |
| **1207** | | | | | | | **10** | 9 | 1190727.12 | 983162.38 | 960906.00 | 435929.59 |
| **1208** | | | | | | | **18** | 13 | 1361411.25 | 1122958.62 | 1097726.62 | 498917.28 |
| **1209** | | | | | | **8** | **26** | 17 | 1375692.25 | 1164394.50 | 1117825.88 | 526169.88 |
| **1210** | | | | | **2 on 1** | | **18** | 9 | 824841.94 | 766713.56 | 679916.94 | 302412.31 |
| **1211** | | | | | | **16** | **26** | 13 | 944539.19 | 815652.62 | 774975.19 | 345330.50 |
| **1212** | **100000** | **3** | **2** | | | **24** | **26** | 9 | 624623.25 | 624236.00 | 525951.00 | 229280.84 |
| **1213** | | | | | | | **10** | 8.5 | 412225.72 | 262212.75 | 269848.50 | 158089.58 |
| **1214** | | | | | | | **18** | 10.5 | 374801.09 | 285174.09 | 273305.72 | 159694.36 |
| **1215** | | | | | | **8** | **26** | 12.5 | 341484.12 | 221982.97 | 332647.72 | 160619.59 |
| **1216** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 287297.12 | 226714.47 | 181864.89 | 109697.83 |
| **1217** | | | | | | **16** | **26** | 10.5 | 261293.08 | 226447.20 | 219003.42 | 110623.05 |
| **1218** | | | | | | **24** | **26** | 8.5 | 209913.34 | 192310.28 | 153612.72 | 82890.59 |
| **1219** | | | | | | | **10** | 8.33 | 323438.50 | 166702.28 | 197893.31 | 39583.26 |
| **1220** | | | | | | | **18** | 9.66 | 482989.38 | 307283.38 | 408645.38 | 51458.27 |
| **1221** | | | | | | **8** | **26** | 11 | 398235.22 | 315044.22 | 418911.31 | 51445.78 |
| **1222** | | | | | **6 on 1** | | **18** | 8.33 | 229541.39 | 155951.02 | 163360.91 | 27348.79 |
| **1223** | | | | | | **16** | **26** | 9.66 | 187780.53 | 150770.27 | 162608.48 | 27339.49 |
| **1224** | | | | | | **24** | **26** | 8.33 | 162131.83 | 139609.16 | 111255.20 | 20508.04 |
| **1225** | | | | | | | **10** | 11 | 1292841.00 | 1097771.25 | 1068772.62 | 494995.97 |
| **1226** | | | | | | | **18** | 15 | 1311798.88 | 1122033.25 | 1075262.25 | 501391.59 |
| **1227** | | | | **10x12** | **2 on 1** | **8** | **26** | 19 | 1385783.62 | 1163824.00 | 1125491.88 | 526904.12 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1228** | | | | | | | **18** | 11 | 894385.88 | 854172.50 | 756456.75 | 342990.62 |
| **1229** | | | | | **2 on 1** | **16** | **26** | 15 | 910772.44 | 808589.50 | 763069.31 | 346956.16 |
| **1230** | | | | | | **24** | **26** | 11 | 677821.81 | 696868.25 | 589615.44 | 259212.62 |
| **1231** | | | | | | | **10** | 10.5 | 269255.47 | 187093.59 | 230194.47 | 159694.36 |
| **1232** | | | | | | | **18** | 12.5 | 254821.08 | 198155.44 | 230411.58 | 160619.59 |
| **1233** | | | | | | **8** | **26** | 14.5 | 235699.67 | 162798.08 | 286778.88 | 160925.81 |
| **1234** | | | **2** | **10x12** | **4 on 1** | | **18** | 10.5 | 190163.53 | 157249.30 | 155184.89 | 110623.05 |
| **1235** | | | | | | **16** | **26** | 12.5 | 174611.05 | 154156.12 | 190746.98 | 110929.30 |
| **1236** | | | | | | **24** | **26** | 10.5 | 137559.78 | 132623.36 | 135054.34 | 83196.77 |
| **1237** | | | | | | | **10** | 10.33 | 174331.08 | 93426.83 | 149101.78 | 39652.24 |
| **1238** | | | | | | | **18** | 11.66 | 138755.73 | 91458.79 | 202289.52 | 39652.24 |
| **1239** | | | | | | **8** | **26** | 13 | 123842.23 | 95944.60 | 203342.92 | 39652.24 |
| **1240** | | | | | **6 on 1** | | **18** | 10.33 | 124320.99 | 84660.82 | 134835.33 | 27339.49 |
| **1241** | | | | | | **16** | **26** | 11.66 | 101486.22 | 81249.52 | 134580.23 | 27339.49 |
| **1242** | **100000** | **3** | | | | **24** | **26** | 10.33 | 85562.93 | 72193.55 | 90775.51 | 20508.04 |
| **1243** | | | | | | | **10** | 5 | 2411448.25 | 1964147.00 | 2054684.50 | 925805.44 |
| **1244** | | | | | | | **18** | 9 | 2463036.50 | 1977620.38 | 2069699.75 | 946383.62 |
| **1245** | | | | | | **8** | **26** | 13 | 2837909.75 | 2247155.00 | 2349864.00 | 1080687.88 |
| **1246** | | | | | **2 on 1** | | **18** | 5 | 1596854.50 | 1476351.12 | 1418008.00 | 612932.31 |
| **1247** | | | | | | **16** | **26** | 9 | 1627154.25 | 1358910.25 | 1417180.62 | 707732.81 |
| **1248** | | | | | | **24** | **26** | 5 | 1182977.38 | 1167280.88 | 1079818.25 | 456628.41 |
| **1249** | | | | | | | **10** | 4.5 | 551050.62 | 349724.97 | 431998.34 | 334016.12 |
| **1250** | | | | | | | **18** | 6.5 | 485988.56 | 362597.94 | 435739.91 | 338156.16 |
| **1251** | | | **4** | **4x6** | **4 on 1** | **8** | **26** | 8.5 | 466328.03 | 377941.06 | 606602.12 | 342967.88 |
| **1252** | | | | | | **16** | **18** | 4.5 | 344222.44 | 281914.59 | 281884.47 | 220828.22 |
| **1253** | | | | | | | **26** | 6.5 | 331763.81 | 259305.28 | 385149.56 | 225420.48 |
| **1254** | | | | | | **24** | **26** | 4.5 | 258031.36 | 234718.47 | 257529.45 | 165372.42 |
| **1255** | | | | | | | **10** | 4.33 | 342847.91 | 169261.20 | 257615.27 | 83413.41 |
| **1256** | | | | | | | **18** | 5.66 | 258534.97 | 169007.89 | 419186.31 | 84577.48 |
| **1257** | | | | | **6 on 1** | **8** | **26** | 7 | 227227.12 | 189234.64 | 430396.91 | 85345.74 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | Culvert Extension Acc. Cost ($) | Guardrail Installation Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1258** | | | | | | | **18** | 4.33 | 210623.31 | 149810.19 | 253697.28 | 55622.54 |
| **1259** | | | | **4x6** | **6 on 1** | **16** | **26** | 5.66 | 184551.00 | 153383.97 | 263436.16 | 56364.71 |
| **1260** | | | | | | **24** | **26** | 4.33 | 157798.56 | 135332.86 | 169589.36 | 41472.95 |
| **1261** | | | | | | | **10** | 9 | 2565739.75 | 2047144.62 | 2085260.12 | 946383.62 |
| **1262** | | | | | | | **18** | 13 | 2913949.50 | 2340243.00 | 2368521.50 | 1080687.88 |
| **1263** | | | | | | **8** | **26** | 17 | 2988561.25 | 2437921.25 | 2463090.25 | 1139327.50 |
| **1264** | | | | | **2 on 1** | | **18** | 9 | 1684530.25 | 1555869.00 | 1425709.75 | 630976.12 |
| **1265** | | | | | | **16** | **26** | 13 | 1934087.25 | 1633605.62 | 1631305.50 | 718995.25 |
| **1266** | | | | | | **24** | **26** | 9 | 1253936.50 | 1249667.62 | 1090219.12 | 470447.34 |
| **1267** | | | | | | | **10** | 8.5 | 737721.44 | 451943.25 | 478117.34 | 342967.88 |
| **1268** | | | | | | | **18** | 10.5 | 633065.56 | 477985.06 | 480823.19 | 346003.75 |
| **1269** | | | | | | **8** | **26** | 12.5 | 603544.69 | 393520.06 | 660900.69 | 347771.59 |
| **1270** | | | | **8x10** | **4 on 1** | | **18** | 8.5 | 465965.00 | 380837.47 | 321006.59 | 228356.73 |
| **1271** | | | | | | **16** | **26** | 10.5 | 447172.25 | 380880.75 | 434805.59 | 230124.97 |
| **1272** | | | | | | **24** | **26** | 8.5 | 355961.56 | 324979.78 | 303328.94 | 169916.86 |
| **1273** | **100000** | **3** | **4** | | | | **10** | 8.33 | 539296.12 | 267663.53 | 314213.75 | 85785.59 |
| **1274** | | | | | | | **18** | 9.66 | 418105.50 | 266078.66 | 483347.47 | 85975.38 |
| **1275** | | | | | | **8** | **26** | 11 | 361098.50 | 297096.75 | 488752.91 | 85953.73 |
| **1276** | | | | | **6 on 1** | | **18** | 8.33 | 350008.84 | 247156.00 | 311031.38 | 56993.18 |
| **1277** | | | | | | **16** | **26** | 9.66 | 299875.91 | 249516.36 | 319228.94 | 56971.53 |
| **1278** | | | | | | **24** | **26** | 8.33 | 257472.78 | 223738.69 | 222045.41 | 42036.89 |
| **1279** | | | | | | | **10** | 11 | 2813927.25 | 2317797.25 | 2335567.75 | 1071009.62 |
| **1280** | | | | | | | **18** | 15 | 2838058.50 | 2370212.25 | 2341655.50 | 1086170.25 |
| **1281** | | | | | | **8** | **26** | 19 | 3005875.25 | 2446748.25 | 2463735.50 | 1141435.62 |
| **1282** | | | | **10x12** | **2 on 1** | | **18** | 11 | 1860898.88 | 1754989.38 | 1607400.62 | 714266.00 |
| **1283** | | | | | | **16** | **26** | 15 | 1897695.50 | 1638863.00 | 1622502.50 | 721975.75 |
| **1284** | | | | | | **24** | **26** | 11 | 1392929.25 | 1409130.25 | 1236266.62 | 531781.94 |
| **1285** | | | | | | | **10** | 10.5 | 515312.25 | 363819.19 | 457278.75 | 346003.75 |
| **1286** | | | | | | | **18** | 12.5 | 480912.38 | 376300.34 | 460137.12 | 347771.59 |
| **1287** | | | | | **4 on 1** | **8** | **26** | 14.5 | 462601.81 | 317401.69 | 644212.88 | 348545.38 |

| Scen. No. | ADT | TGF | Curvature | Culvert Size | Slope Steepness | Slope Offset | Culvert Offset | Slope Depth | Do-Nothing Acc. Cost ($) | **Culvert Extension** Acc. Cost ($) | **Guardrail Installation** Acc. Cost ($) | Grating Acc. Cost ($) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1288 | | | | | | | 18 | 10.5 | 343513.44 | 292642.97 | 308005.88 | 230124.97 |
| 1289 | | | | | 4 on 1 | 16 | 26 | 12.5 | 329736.38 | 288133.44 | 415221.06 | 230901.03 |
| 1290 | | | | | | 24 | 26 | 10.5 | 256639.92 | 248687.55 | 293676.09 | 170588.17 |
| 1291 | | | | | | | 10 | 10.33 | 311312.69 | 164131.80 | 280010.81 | 85953.73 |
| 1292 | **100000** | 3 | 4 | 10x12 | | | 18 | 11.66 | 227223.38 | 162341.38 | 462594.59 | 85953.73 |
| 1293 | | | | | | 8 | 26 | 13 | 223852.16 | 178508.69 | 465728.25 | 85953.73 |
| 1294 | | | | | 6 on 1 | | 18 | 10.33 | 202581.14 | 144527.89 | 297246.25 | 56971.53 |
| 1295 | | | | | | 16 | 26 | 11.66 | 178397.94 | 144403.03 | 300767.16 | 56971.53 |
| 1296 | | | | | | 24 | 26 | 10.33 | 148549.58 | 124113.41 | 206028.31 | 42036.89 |