2012 INFRASTRUCTURE REPORT CARD

FOR THE COLORADO SPRINGS AREA

ASCE
COLORADO SECTION
Southern Colorado Branch

Table of Contents

Publication Design: CTU/Eagle Graphic Group, Art Director- Shawn Mitchell, Art Director- Dustin Glatz, Creative Director- John Chlebus   Front Cover: John Chlebus

Executive Summary

This 2012 Infrastructure Reoprt Card for the Colorado Springs Area is provided to the citizens of the Pikes Peak region as a public service. The American Society of Civil Engineers (ASCE) Southern Colorado Branch developed the Report Card in order to help our citizens understand the complexity and magnitude of our infrastructure systems and to alert them to the challenges that we face maintaining and improving these critical physical components of our local community.

Both the national 2009 Report Card for America's Infrastructure and the 2008 Colorado Infrastructure Report Card issued an overall grade for their respective infrastructure systems. We have not provided an overall cumulative grade for the Colorado Springs area infrastructure systems. This is because we researched only six infrastructure categories, and publishing an overall cumulative infrastructure grade for the Colorado Springs area would imply a level of inclusiveness that is not justified by this report. Rather, we have provided grades for each of the six infrastructure categories that we did evaluate, and the individual grades stand on their own merits. The six infrastructure categories included are bridges, drinking water, roads, stormwater, transit and wastewater.

This report card is the result of a volunteer effort by civil engineering professionals and others in our local community from both the private and public sectors. Six subcommittees were established corresponding to the six infrastructure categories evaluated in this report. The subcommittees consisted of engineers with specific expertise in the infrastructure systems that they graded. Each subcommittee was asked to evaluate the infrastructure system in the way they deemed best based on their professional judgment and experience. As a result, there are some variations in grading components considered and methods of grade determination between the six infrastructure categories. The contributors to this Report Card are listed at the back of this document.

The results for each of the six infrastructure categories evaluated are summarized below. As you can see, the results vary.

If you had a child that brought home a report card like this, how would you react?

We hope that this report will stimulate a spirited discussion regarding the state of our local infrastructure, the importance of our infrastructure, and the priority that we as a community should assign to maintaining and improving our infrastructure systems. In a way, our infrastructure systems are similar to our automobiles. We tend to take them for granted until they break down. Unfortunately, when an infrastructure system fails the consequences are much more significant than the occasional stalled car along I-25.

We live in one of the most attractive settings in the country. We are a can-do results-oriented community. We urge our fellow citizens to consider where we live, ponder our priorities, and take the steps necessary to protect and improve our community's physical backbone- the Colorado Springs area infrastructure systems.

The Colorado Springs Area Infrastructure Report Card Committee
American Society of Civil Engineers

Category	2012 Grade	Comments
Bridges	D+	Under the current funding scenario, our bridges must last an average lifespan of 600 years. We are seriously deficient in our ability maintain the bridges that we have and replace the bridges that need replacing.
Drinking Water	B-	The Southern Delivery System project is of major benefit to our community and will have a lasting positive impact. However, it has also siphoned funding from other important water supply system needs.
Roads	D	The Pikes Peak Rural Transportation Authority (PPRTA) program has contributed greatly to improvements in our roadway systems over the last seven years. However, if it is not continued we risk a repeat as the most congested city of our size in the nation.
Stormwater	D-	We are at risk for multiple millions of dollars in damage if we experience a 100-year storm event. And weather statistics indicate that we are due. There is no way to counter this sobering threat without establishing some method of substantial, consistent stormwater project funding.
Transit	C-	Our sprawling city and relatively low population density present significant challenges to providing an affordable, sustainable transit system. But our fellow citizens who rely on public transit for their livelihoods and basic life necessities deserve our best efforts to maintain and improve our current transit system.
Wastewater	B	Nothing quite gets our attention like a major sanitary sewer system failure. We have excellent capacity to handle future population growth, but we need to address the advancing age of a significant percentage of our wastewater pipelines that have been in the ground for over 40 years.

Introduction

Founded in 1852, the American Society of Civil Engineers (ASCE) represents more than 140,000 members of the civil engineering profession worldwide and is America's oldest national engineering society. ASCE's mission is to provide essential value to its members and partners, advance civil engineering, and serve the public good. In carrying out that mission, ASCE:

- Advances technology
- Encourages lifelong learning
- Promotes professionalism and the profession
- Develops civil engineer leaders
- Advocates infrastructure and environmental stewardship

Since 1998, ASCE has issued three national infrastructure report cards, the latest being the 2009 Report Card for America's Infrastructure. These Report Cards depict the current state of the nation's infrastructure and provide recommendations for improvement. The Report Cards have been cited in numerous articles and academic studies, and the nation's political leaders rely on the Report Card to provide them with clear information which they can use as a guide for policy decisions. The overall grade for America's infrastructure in the 2009 Report Card was a D. The 2009 Report Card for America's Infrastructure can be found at www.asce.org/reportcard/.

The Colorado Section of ASCE issued the first Colorado Infrastructure Report Card in 2003. The Section released an updated Colorado Infrastructure Report Card in 2008. The overall grade for Colorado's infrastructure in 2008 was C+, and that grade was projected to drop to C by 2010. The 2008 Colorado Infrastructure Report Card is available at www.coloradoasce.org/misc/2008Report.pdf.

The Colorado Springs Branch of ASCE was founded in 1976. The Branch was reconstituted in 2004 as the Southern Colorado Branch and now has more than 300 professional members with careers in the private sector, municipal, county, state and federal government.

The ASCE Southern Colorado Branch Board of Directors voted to sponsor development of a local Infrastructure Report Card in July of 2011. Tough economic times over the previous three years and associated decreases in both tax revenues and staffing have placed a strain on the ability of local jurisdictions in the Pikes Peak region to maintain and/or improve public infrastructure systems. The Board of Directors felt that producing a local Infrastructure Report Card would provide a significant public service by helping to educate the community regarding both the importance and the vulnerabilities of their local infrastructure systems. The Report Card scope includes the greater Colorado Springs area, which encompasses approximately 195 square miles within the city limits and is home to about 420,000 people, not including adjacent communities.

The 2009 Report Card published by ASCE evaluated fifteen separate infrastructure categories: aviation, bridges, dams, drinking water, energy, hazardous waste, inland waterways, levees, public parks and recreation, rail, roads schools, solid waste, transit and wastewater. Out of necessity, the Colorado Springs infrastructure report card evaluates five of the fifteen categories, and adds an additional infrastructure category not included in the national Report Card. The five national categories also evaluated in the Colorado Springs Report Card include bridges, drinking water, roads, transit and wastewater. Stormwater was added due to its significant impact on other local infrastructure systems as well as real property and life safety. So, in addition to completing an evaluation of the Colorado Springs stormwater system, the Report Card stormwater subcommittee developed a template for stormwater system evaluation that could potentially be of use nationally.

Funding for this project was provided by the ASCE Southern Colorado Branch, the ASCE Colorado Section and through a State Public Affairs Grant from the ASCE national office in Reston, Virginia.

As you review the six infrastructure categories that follow, please keep in mind that they are indispensable in contributing to the quality of life and economic opportunities that we so enjoy in our Pikes Peak region.

Bridges

Overall Grade: D+

In the City of Colorado Springs, bridges are a critical component of our transportation system, which is essential to a healthy local economy and attractive quality of life. In general accordance with the Federal Highway Administration (FHWA) practice, the City of Colorado Springs categorizes bridges as either major structures (span lengths over 20 feet long) or minor structures (span lengths of 4 feet to 20 feet or pedestrian-only bridges). The current Colorado Springs bridge inventory includes 222 major structures and 242 minor structures. The oldest bridge was built in 1902, and 50% of the bridges currently in use were built between 1970 and 1990.

Although this Report Card assesses the City of Colorado Springs bridges only, it is instructive to note that there are approximately 1200 major and minor bridge structures in El Paso County as a whole. Of these, the City of Colorado Springs owns 464, the Colorado Department of Transportation (CDOT) owns 407, while El Paso County and other local agencies own the remaining balance. Based on the ratio of major to minor structures for both the City and CDOT, the overall ratio of major to minor bridge structures in El Paso County is about half and half.

Over the past few years, the City of Colorado Springs has developed a 25-year inventory of needs to manage the 464 bridges in the community. The capital improvement part of these needs includes the replacement of 61 bridges and rehabilitation of 36 bridges during this time frame. The development of this inventory significantly increased awareness of the magnitude of bridge needs in the City. Over the past 20 years the City has replaced 15 bridges. At that rate of bridge replacement (0.75 bridges per year), the City is by default expecting an average life of 600 years for the bridges in the inventory. Obviously, a 600-year bridge life is not a realistic expectation. The very significant shortfall in bridge capital improvement funds constitutes a serious risk to the health of this community's transportation infrastructure system.

During the development of the City's bridge inventory of needs, it became clear that a shift from the traditional approach to evaluating the health of the bridge infrastructure system was required. In the past, the City had managed its bridge assets using standard methods developed by the FHWA and commonly employed across the country. The City concluded that dependence solely upon the Sufficiency Rating and Structurally Deficient/Functionally Obsolete Indicator status defined by the FHWA in the *Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges* resulted in insufficient information to adequately address bridge problems in Colorado Springs. Consequently, the City developed a new evaluation system to identify existing issues and project future bridge needs. The basic characteristics of this system included more detailed evaluations of existing conditions, quantification of the major issues at each bridge and projection of future needs based on expected bridge life. The City is continuing to develop this system, but believes that it provides a much better understanding of the City's bridge needs and challenges than was obtained via traditional evaluation methods.

If the City is able to fully address the capital improvement needs identified in the 25-year inventory of needs discussed above,and is able to continue this effort in the future, the expected average bridge life will be reduced to approximately 150 years.This is still short of the city's goal of a 100-year bridge life.While still long, the average bridge lifespan currently planned presents a much more realistic and manageable scenario than the 600-year long average lifespan currently burdening the City.

While this Report Card addresses only bridges designed to carry vehicular traffic, it is important to note the condition of an additional category of bridges in this area. The City of Colorado Springs also has a number of major railroad structures that do not receive Sufficiency Ratings or SD/FO indicators. These bridges are important to the transportation network because they carry the railroad over road. These sixteen structures are some of the oldest in the City of Colorado Springs and do have condition problems. Of these sixteen bridges, over one third have significant problems with their condition or pose safety risks due to very limited roadway horizontal and vertical clearances. The City has put five of these structures on the replacement list due to the critical importance of these structures to the local, state and national functions that the rail line serves. If this need is extrapolated to the remainder of El Paso County, there are approximately 15 to 20 additional railroad bridges in the County that are in need of attention.

To arrive at an overall grade for the highway bridge infrastructure category, the following seven components of the bridge infrastructure system were evaluated: Capacity, Condition, Funding, Future Need, Operations and Maintenance, Public Safety and Resilience.

Capacity

Per national FHWA criteria, bridges are considered "deficient" when they have a Sufficiency Rating (SR) of less than or equal to 80 and are classified as either Functionally Obsolete (FO) or Structurally Deficient (SD). These bridges are in need of rehabilitation (major reconstruction) and are eligible for federal bridge rehabilitation funding. When the SR drops below 50, complete bridge replacement may be warranted. The SR is assigned by trained bridge inspectors and is a formula-based value ranging from 100 for a fully sufficient bridge to 0 for an entirely deficient structure. Structural deficiencies are triggered by deteriorated conditions of bridge elements and reduced calculated load-carrying capacities. An SD designation does not mean that a bridge is necessarily unsafe; but an SD bridge typically requires significant repair or reconstruction to remain in service and may eventually require full replacement. A bridge is considered Functionally Obsolete when it does not meet current design standards, either because of increased traffic volume, poor clearance or approach roadway geometry, or due to changes to the design standards. A FO bridge may need to be widened, rehabilitated, or replaced depending on the specific deficiencies. For the purposes of this section, capacity refers to both the load carrying capacity of the bridge (which may be flagged by an SD rating) and the traffic capacity of the bridge (which may be flagged due to an FO designation). Since both the SD and FO designations are related to the Sufficiency Rating, the Sufficiency Ratings are used as an indicator of the overall capacity of the City of Colorado Springs bridges. Of the 222 major bridge structures owned by the City, 22 have a Sufficiency Rating from 50 to 80, and 7 have a Sufficiency Rating below 50. So 13% of the City's major bridges are in need of major rehabilitation or replacement due to capacity issues. Since the Federal government does not require bridge inspections for minor structures, sufficiency ratings are not available for the 242 minor structures in the City's inventory. However, it is reasonable to assume that about the same percentage of minor structures as major structures are in need of major rehabilitation or replacement. Furthermore, the 13% figure probably approximates the capacity deficiencies for the overall El Paso County bridge inventory as well.

Capacity Grade: C

Condition

There is a need to change the way we in the U.S. are evaluating and quantifying bridge conditions. The current methods do not adequately predict the full potential life span from our bridges and also tend to encourage reactive emergency management rather than consistent proactive bridge management. Because of this, the City of Colorado Springs has developed a system that identifies condition issues, risk issues and safety issues. This system does not rely solely on the traditional bridge Sufficiency Ratings, which are based only on Functionally Obsolete/Structurally Deficient indicators. As a result, City officials are convinced that they have a more comprehensive understanding of bridge condition and needs than was possible in the past.

The existing condition of the structures is clearly demonstrated by the list of over 2000 bridge maintenance needs currently identified by the City of Colorado Springs. Additionally, while bridges are normally inspected every two years, there are 16 bridges on the City's Enhanced Inspection List that must be inspected every 90 days due to deterioration issues. The most serious issues are bridge deck and channel deterioration conditions, but there are many other items of concern as well. If the ratio of maintenance items to bridges is extrapolated from the City to the entire County, there are over 6000 maintenance tasks required in order to improve the condition of the bridges in El Paso County to an acceptable level.

In the City of Colorado Spring's efforts to improve bridge asset management, the City has recognized that a combination of documentation of existing problems and forecasting of future problems is required to fully grasp the bridge infrastructure challenges. The most significant issue identified has been the historic lack of future bridge deck problems forecasting. Addressing and correcting this weakness has resulted in the current totals of over 30 bridges on the rehabilitation list and 65 bridges on the replacement list. This represents over 20% of the City's total current bridge inventory.

Condition Grade: D

Funding

Funding in the Colorado Springs area for bridges is very limited. Local jurisdictions' general fund capital improvement and maintenance budgets dedicated specifically to bridges are almost non-existent. When they do occur, general fund expenditures for bridges are most typically triggered by emergencies. Federal funding allocated to Off-System Bridges (bridges which are not under CDOT jurisdiction) in the entire State of Colorado is a total of approximately $2 million/year. Obviously, only a small percentage of these funds could possibly be available to address issues in the Colorado Springs area. Without significant local jurisdictional general funding or appreciable federal dollars, the Colorado Springs area has relied on the Pikes Peak Rural Transportation Authority (PPRTA) to fund critical bridge capital and maintenance projects over most of the last decade. Detailed information on the history, completed bridge projects, and ongoing projects funded by the PPRTA is available at www.PPRTA.com. However, with the exception of $1.6 million per year of funding for bridge maintenance in the City of Colorado Springs, the PPRTA funding expires in 2014. Colorado Springs area residents will vote on whether to continue the PPRTA transportation funding mechanism in November of 2012.

If voters do not approve continuation of the PPRTA transportation funding mechanism, there will be almost no capital improvement funding available for bridge replacement and rehabilitation starting in 2014. For maintenance, the City has about half of the maintenance funding needed to address the currently identified needs. The lack of both capital and maintenance funding is a serious impediment to the development of the proactive bridge assets management program that the City of Colorado Springs is seeking to implement. Without a consistent, sufficient funding stream for bridge capital and maintenance projects, the City will be unable to manage its bridge assets in any way other than a reactive mode driven by emergencies. This is not the way to "run a railroad", much less an extensive bridge infrastructure system.

Funding Grade: F

Future Need

The City of Colorado Springs has invested a significant effort in gaining an understanding of its bridge system capital and maintenance requirements. As a result, the City has identified $200 million in bridge needs over the next 25 years. This includes a combination of existing and projected maintenance and capital needs. If the City's situation is extrapolated by ratio, it is estimated that there is over $600 million in funding needed for bridges in El Paso County in the next 25 years.

Current funding levels address only 19% of the City's bridge needs. At this rate of funding, it will take over 125 years to address the currently identified problems. In addition, with over 50% of the bridges in the City reaching an age of 50 years over the next 30 years, there is a significant need for greater funding. This need is recognized, but not fully quantified at this time. The City has, however, begun to discuss this issue and the strategies required to manage this challenge. Most strategy options include efforts to spread out the duration of this bubble of need, thus decreasing required annual bridge systems expenditures. Regardless of the specifics, we are approaching a period during which bridge funding needs will be even greater than the current projections. Thus the overall situation is actually worse than the already bleak picture we have today.

Future Need Grade: F

Operation and Maintenance

As noted previously, bridge work in the Colorado Springs area has been driven more by responses to emergencies than by proactive planning. This is primarily due to limited bridge capital and maintenance funding. The present level of bridge maintenance funding from the PPRTA (approximately $1.6 million annually) provides about 50% of the currently identifiable bridge maintenance funding needs. A strong case can be made that the reactionary approach to bridge asset management, driven by lack of funding, actually costs more over than a consistent, deliberative program of preventative maintenance and scheduled replacements.

The City of Colorado Springs has been working to move away from the emergency response mode of operation, but faces fiscal challenges. Unfortunately, maintenance is not an attractive item to fund because it is difficult to measure the value of the investment. Thus, in constrained budget environments, it is common to defer recurring bridge maintenance in favor of other funding priorities. This results in accelerated bridge deterioration, higher rates of infrastructure emergencies, and shortened bridge lifespans.

Operation and Maintenance Grade: D

Public Safety

As stated previously, 13% of the City's bridges have deficient sufficiency ratings, thus negatively impacting the public safety. Deficient bridges impact public safety in various ways. As noted in the Capacity section previously, a Functionally Obsolete bridge is one whose design is no longer functionally adequate for its task. Functionally obsolete bridges might not have enough lanes to accommodate the traffic flow or space for emergency shoulders. There may be inadequate clearance for modern and oversized vehicles. These conditions obviously have a negative impact on public safety. Additionally, these bridges may have load restrictions as well as clearance restrictions. Such bridges may hurt emergency vehicle response times and endanger those in need of care.

Public Safety Grade: B-

Resilience

Resilience is one of the key indicators of an infrastructure system's quality. Although resilience has multiple definitions depending on context, infrastructure resilience refers to the capability of a system to prevent or protect against significant multi-hazard threats and its ability to rapidly recover and ensure continuity of critical services, with minimal negative impact to the public health and safety, following a catastrophic event. The ASCE approach to measuring an infrastructure system's resilience is to evaluate the system with respect to four key qualities: *robustness, redundancy, resourcefulness and rapidity.*

For an infrastructure system to exhibit resilience, it must be strong enough to endure an elevated level of stress. This is called *robustness.* When catastrophic events such as an earthquake, flood, wild fire or terrorist attack occur, an infrastructure system that is robust will be able to continue its original function without failure. This does not necessarily imply that the system won't experience decreased performance for a period of time, but does infer that the system can continue operating at some minimum level of performance. The fact that Colorado Springs has not experienced a catastrophic bridge failure is one indication that its bridges are generally robust. However, the 14 bridges in Colorado Springs that are Structurally Deficient reduce the overall robustness and indicate that the robustness margin is narrowing.

The second key indicator of an infrastructure system's resiliency is its *redundancy*. If part or all of the system is destroyed or disabled, there must be alternate means of providing some continuing minimum level of that system's service. The closer the alternate service level is to the original service level, the greater the system's redundancy. Since there are multiple crossings over the major drainageways in the Colorado Springs area, the loss of one or even several bridges would be inconvenient, but not catastrophic, for the local population. So our bridge system's redundancy compares favorably with outlying rural areas, where loss of a bridge crossing could result in detour routes of many miles.

When critical infrastructure systems are damaged or destroyed, the quality of the response has a significant impact on the system's resilience. What resources are available, and how effectively can they be used to repair or replace the affected system? The ability to commit the right resources in the correct manner in response to a catastrophic event defines the system's *resourcefulness*. Flexibility in problem solving and decision making by officials responsible for the infrastructure system, as well as planning for and a willingness to share resources across jurisdictional and organizational boundaries are key components to obtaining and maintaining a resourceful infrastructure system. The Waldo Canyon Fire during the summer of 2012 clearly demonstrated the strength of Colorado Springs area and El Paso County government agencies, as well as the population in general. The cooperative efforts in response to this major disaster set a sterling example for other communities to emulate. Clearly, resourcefulness is a very significant strength of the Colorado Springs community. This community attribute applies to the management of its bridge infrastructure system and responses to bridge problems.

The final key indicator of infrastructure resilience is *rapidity*. Rapidity is an infrastructure system's ability to recover quickly from damage or failure. Rapidity depends on effective preplanning, availability of manpower, materials and equipment, efficient communications, and timely decision-making. The magnitude of an actual catastrophic event is normally beyond the control of those responsible for the infrastructure system. Therefore, rapidity is a relative metric and must be scaled according to the magnitude of the damage to the system. For reasons similar to those described in the discussion of resourcefulness, rapidity can be considered a strength with respect to the Colorado Springs bridge system. Rather than instruments of bureaucratic inertia, those responsible for our bridges can be characterized as dedicated, "can do" problem solvers. Due to the character of the community and the quality of those overseeing the Colorado Springs area system, resilience must be considered a bright spot when evaluating our bridges.

Resilience Grade: A-

Bridge Grade Determination

Each of the seven grading components discussed above is weighted equally. Letter grades are assigned the following numerical values:

A	4.0	C	2.0
A-	3.7	C-	1.7
B+	3.3	D+	1.3
B	3.0	D	1.0
B-	2.7	D-	0.7
C+	2.3	F	0.0

Based on the letter grades given for each of the seven evaluation components, the numerical average for the Colorado Springs bridge infrastructure system is 1.5. Thus, according to the letter grade to numerical conversion shown above, the Colorado Springs bridge infrastructure system receives an overall letter grade of D+.

Recommendations

1. Colorado Springs area residents should support the extension of the PPRTA funding mechanism on the November 2012 ballot.
2. City officials must continue to seek creative ways to provide for the bridge capital and maintenance requirements highlighted in this report.
3. City transportation and bridge engineers should continue to maintain and advance the customized bridge evaluation process and system that they have developed.

Drinking Water

Overall Grade: B-

Introduction

The City of Colorado Springs covers almost 200 square miles on the eastern plains of Colorado and is home to more than 416,000 residents, according to the 2010 Census. Colorado Springs Utilities (Utilities) is a community-owned utility company that provides water, wastewater, gas and electrical services to its customers. In the late 1800's, Colorado Springs residents approved funding for the first water system, which consisted of a series of ditches within the city limits. Today, Colorado Springs's water system has 2,010 miles of distribution pipelines, 29 storage reservoirs, and five water treatment facilities, with Colorado Springs Utilities customers using 23.7 billion gallons of water per year.

Water for Colorado Springs Utilities is blended from many sources, including surface water, ground water and purchased water. Nearly 75% of Colorado Springs water comes into the city through transmountain collection systems along the Continental Divide, which convey high county snowmelt to the city. This means the residents of Colorado Springs are primarily first time users of their water. The collection systems include the Homestake, Fryingpan-Arkansas, Twin Lakes and Blue River systems. Many of these systems are aging (50 years plus) and are starting to experience failures.

In addition to the transmountain systems, Colorado Springs Utilities has several sources of local surface and ground water. These included the north and south slopes of Pikes Peak, North and South Cheyenne Creeks, Fountain Creek, Monument Creek, Northfield Watershed, Arapahoe aquifer, Denver aquifer, and Laramie-Fox Hills aquifer.

The water infrastructure for Colorado Springs receives an overall grade of B -. Colorado Springs Utilities water infrastructure will continue to require repairs and/or replacements to keep its aging infrastructure in top shape.

Evaluation Methodology

In the development of the report card grade for water, the following six fundamental components of the infrastructure were considered:

- Capacity: based on long term planning.
- Condition: based on the age of the system.
- Funding: based on the ability to fund current and future system needs
- Operation and Maintenance (O&M): based on staffing, planning and funding.
- Public Safety: based on safeguards that are in place.
- Resilience: based on robustness, redundancy, resourcefulness, and rapidity.

Each of these components was graded independently based on information received from interviews, raw data, annual reports, Colorado Springs Utilities website, and media releases. The individual scores were then used to calculate an overall score for the water infrastructure.

Capacity

Colorado Springs Utilities follows its 2012 – 2016 Strategic Plan/2012 Annual Operating Plan, which identifies upcoming water projects and their budgets. In addition, Colorado Springs Utilities also follows the 2008 – 2012 Water Conservation Plan, which is currently in the process of begin updated. Both plans highlight the importance of the Southern Delivery System (SDS) project and how it will provide redundancy to current systems and meet the future needs of Colorado Springs. According to the 2012 – 2016 Strategic Plan, SDS consumes nearly 80% of the total budget for water projects.

The Southern Delivery System has been in the planning stages for almost 20 years and is currently under construction with an expected completion date of 2016. The SDS is a comprehensive water supply project that delivers raw water from the Pueblo Reservoir to a new water treatment plant (WTP) east of the City of Colorado Springs. The project includes over 50 miles of raw water pipelines and three raw water pump stations, storage reservoirs, and a 130-million gallons per day (mgd) water treatment plant. The project is designed to transfer up to 78 mgd from the Pueblo Reservoir to the water treatment plant via the raw water conveyance system. Once SDS is complete, Colorado Springs Utilities will have adequate water supplies to meet projected needs through 2046.

Therefore, Colorado Springs Utilities has demonstrated that they have long-term plans identified and in place to meet future demands.

The capacity grade is based on the assumption that the SDS will be completed as planned. If this does not happen, both the capacity grade and the overall Drinking Water grade will drop significantly.

Capacity Grade: A

Condition

A condition evaluation was conducted for the existing raw water supply pipelines and potable water pipelines based on data provided by Colorado Springs

Utilities. A total of 220 miles of pipelines were evaluated. The age of the infrastructure evaluated went as high as 108 years. The diameter of the pipes evaluated ranged from 12-inch to 108-inch. Systems not evaluated were non-potable water systems and water lines smaller than 12 inches. Figure 1 shows the pipelines categorized by age group evaluated.

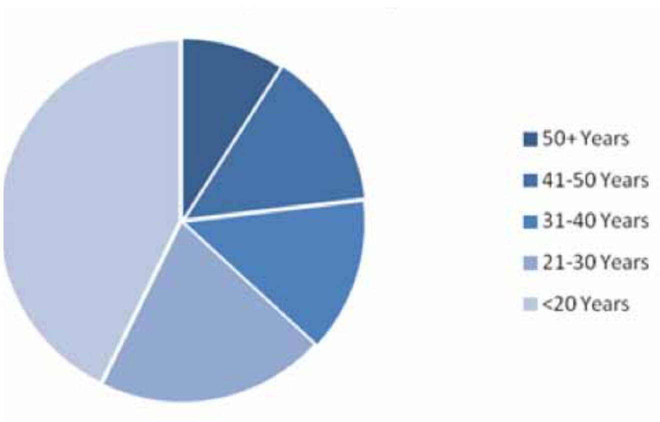


Figure 1: Water pipeline age.

Typical water system failures are caused by age, corrosion, breaks due to mis-located utilities during construction, and natural causes such as flooding, lighting and freezing. Colorado Springs Utilities performs annual condition assessments on many of the water pipeline systems, which assist in identifying future improvements to extend the life of the pipeline.

Condition Grade: C-

Funding

Since 2007, Colorado Springs Utilities has spent over $37 million on water distribution rehabilitation. The budget for the next three years is approximately $16 million. According to the 2012 – 2016 Strategic Plan the capital improvement budget for water in 2012 is approximately $170 million. This is up by $56 million from the previous year due to the construction of the SDS project. There has been pressure put on budgets due to planned expenditures on the SDS project; however the planned budgets for projects outside SDS are adequate to meet the current and future funding needs identified in the 2012 – 2016 Strategic Plan.

With regards to emergency funding, Colorado Springs Utilities does have a small contingency fund available for emergencies associated with water system failures. If the contingency funds are not sufficient, Colorado Springs Utilities has the ability to rebudget if necessary to meet the need of the emergency.

Colorado Springs Utilities has demonstrated that they have funding identified and in place to meet current and future needs through 2016, however, emergency funding is limited. Additionally, there is pressure on future budgets due to the SDS project that reduces the funding grade.

Funding Grade: B-

Operation and Maintenance

As previously mentioned, there has been pressure put on budgets due to planned expenditures for the SDS project. This holds true for the Operations and Maintenance (O&M) budgets for Colorado Springs Utilities. Although their budgets and staffing plans are sufficient to meet the current needs for their system, they are not sufficient for future needs. This is primarily due to the additional infrastructure O&M needs associated with SDS. Additional technical staff and funding will be required to meet the needs of the future drinking water infrastructure.

Colorado Springs Utilities does have a detailed O&M program for its entire water infrastructure system including reservoirs, tunnels, pump stations and pipelines. This O&M program is an integral part of the 2012-2016 Strategic Plan.

Colorado Springs Utilities demonstrated that they have O&M plans established, however budget and staffing needs may not be sufficient for the future when the Southern Delivery System is completed.

Operation and Maintenance Grade: C+

Public Safety

Public safety is a top priority for Colorado Springs Utilities. Colorado Springs Utilities has several safeguards in place to assist in preventing failures to their existing systems. These safeguards include but are not limited to regular maintenance inspections, caretakers for high mountain systems, a water born pathogen emergency plan, and sophisticated Supervisory Control and Data Acquisition (SCADA) systems for the drinking water infrastructure system.

Colorado Springs Utilities recently implemented emergency action response plans for all their water, wastewater, gas, and electric infrastructure systems. These plans included specialized training in emergency action response in coordination with local and regional authorities. Colorado Springs Utilities also has its own Wildland Fire Team, which is comprised of employees dedicated to protecting the city's watershed lands and infrastructure and to providing regional support in the event of a catastrophic wildfire.

Most recently, the city of Colorado Springs was impacted by the Waldo Canyon Wildfire that destroyed close to 350 structures within the city limits and burned over 18,000 acres. Many water and wastewater facilities were also threatened by the fire. Due to the emergency action response plans in place and the efforts by the Wildland Fire Team and other firefighters, the water and wastewater facilities avoided damage due to the fires. It is anticipated the effects of the fire will continue for years to come and Colorado Springs Utilities is focused on minimizing those effects to its users.

Colorado Springs Utilities has demonstrated that they have safeguards in place to prevent failures, in addition to their emergency action plans.

Public Safety Grade: A

Resilience

For the water infrastructure system to exhibit resilience, it must be strong enough to endure an elevated level of stress. This is called robustness. When a catastrophic event such as a pipeline failure occurs, the water infrastructure system that is robust will be able to continue to serve its customers without failure. This does not necessarily imply that the system won't experience decreased performance for a period of time, but does infer that the system can continue operating at some minimum level of performance. Based on information presented herein, Colorado Springs Utilities water infrastructure system is generally robust. However, the aging water infrastructure of the transmountain water systems reduces the overall robustness and indicates that the robustness margin is narrowing.

The second key indicator of an infrastructure system's resiliency is its redundancy. If part or all of the system is destroyed or disabled, there must be alternate means of providing some continuing minimum level of that system's service. The closer the alternate service level is to the original service level, the greater the system's redundancy. Once the SDS is in service, which is planned for completion in 2016, Colorado Springs Utilities will significatly increase its redundancy. Until then, the redundancy is limited by the current system and its ability to provide coverage when a portion of the system is disabled.

The ability to commit the right resources in the correct manner in response to a catastrophic event defines the system's resourcefulness. The Waldo Canyon Fire during the summer of 2012 clearly demonstrated the strength of Colorado Springs Utilities and their resources to help fight the wildfire, especially in areas of valuable water infrastructure.

The final key indicator of infrastructure resilience is rapidity. Rapidity is an infrastructure system's ability to recover quickly from damage or failure. Rapidity depends on effective planning, availability of manpower, materials and equipment, efficient communications, and timely decision-making. For reasons similar to those described in the discussion of resourcefulness, rapidity can be considered a key strength with respect to the Colorado Springs Utilities water infrastructure system.

The aging transmountain water infrastructure system tends to pull down the resilience grade. The system resilience will be significantly improved when the Southern Delivery System becomes operational.

Resilience Grade: B

Summary

Grades from each of the components evaluated above were weighted and combined per the decision criteria presented in Appendix A to generate the overall grade for the water infrastructure system owned and managed by Colorado Springs Utilities. As shown below, the overall grade for water is B -.

Recommendations

1. Although Colorado Springs Utilities is above the curve on many aspects of their water infrastructure, they must continue to focus on several aspects to maintain service reliability and to prevent deterioration in their overall grade.
2. As many of their systems approach their design life, deterioration and failures will become more prominent. We need to make appropriate investments and start planning now. Colorado Springs Utilities must continue to be proactive in their maintenance operations and repairs.

Primary Criteria	Weighting Factor	Letter Grade	Numerical Grade	Wighted Value
A – Capacity	24%	A	5.0	1.20
B – Condition	29%	C-	3.1	0.90
C - Funding	19%	B-	4.2	0.80
D – O&M	9%	C+	3.7	0.33
E – Public Safety	14%	A	5.0	0.70
F - Resilience	5%	B	4.5	0.23
Average (5.0 Scale)		B -		4.16

Sources:

1. Lauri Martin, Main Water Line Springs A Leak. November 1, 2006, http://www.kktv.com/home/headlines/4544476.html
2. Colorado Springs Utilities, Our Water System, April 2012, http://www.csu.org/residential/water/Pages/watersystem.aspx.
3. Allison, Tyler. Personal Interview, April 10, 2012.
4. Colorado Springs Utilities, 2012 – 2016 Strategic Plan and 2012 Annual Operating Plan, http://www.csu.org/residential/about/Documents/2012%20AOP%20and%202012-2016%20Strategic%20Plan%20Revised.pdf
5. Colorado Springs Utilities, 2008 – 2012 Water Conservation Plan. http://www.csu.org/residential/water/documents/item14309.pdf

Roads

Overall Grade: D

A well-maintained road system that provides regional mobility is critical for the economic vitality of the City of Colorado Springs. The City of Colorado Springs is a member of the Pikes Peak Area Council of Governments (PPACG). PPACG is the Metropolitan Planning Organization (MPO). As the MPO, PPACG is responsible for producing and maintaining a regional travel demand model that forecasts traffic volumes on the area's roadway network. PPACG is also responsible for formulating the regional transportation plan which determines how transportation funding is distributed throughout the region. Because of the availability of data from PPACG's 2035 long range transportation plan, Moving Forward Update, which is for the overall region, the roads section reports conditions based on regional information.

Evaluation Methodology:

Each category was reviewed with respect to how well the region's roadway network meets the overall needs of the region. If the road network meets 90% or more of the region's needs in a category, it received a letter grade of A. If the road network meets 80% or more of the region's needs, it received a letter grade of B, and so on.

Capacity

The PPACG can determine the current congestion levels and project the future congestion levels using statistical models. Congestion is measured using Level of Service (LOS). LOS of roadways is measured in letter grades A - F with LOS A representing near free flow conditions and LOS F representing heavy congestion:

- LOS A - C are considered acceptable for traffic flow.
- At LOS D – E, a roadway is considered at capacity.
- LOS F is over capacity.

PPACG provided information on the percentage of the region's roadway lane miles that are operating at each of these LOS ranges. These results are summarized in the table below.

LOS	2010 Lane Miles	2010 % Total Lane Miles	2035 Lane Miles	2035 % Total Lane Miles
LOS A-C	2641.3	84.0%	2210.3	67.1%
LOS D-E	369.4	11.8%	541.2	16.4%
LOS F	132.7	4.2%	541.2	16.4%

As can be seen from the table, over 80% of the region's roads currently operate at an acceptable LOS. However, by the year 2035, under 70% of the region's roads will operate at an acceptable LOS. When these two are averaged together, the capacity for current and future conditions recieves a grade of C.

Capacity Grade: C

Condition

PPACG records the pavement conditions of the region's roads. Information provided in the Moving Forward Update indicates that 55% of the region's vehicle miles traveled are on roads with good pavement conditions, 38% on fair pavement conditions, and 7% are on poor pavement conditions. Given that only 55% of the region's vehicle miles traveled are along roads with good pavement conditions, this category receives a letter grade of D.

Condition Grade: D

Funding and Future Need

The forecast cost of the transportation system needs (transit, roadway, and non-motorized) through 2035 as determined during the Moving Forward Update planning process is $12 billion. The projected funding available through the year 2035 is $4.37 billion, including

PPRTA funds which are projected to provide $1.1 billion between 2012 and 2035, assuming the extention of the capital improvements portion of the PPRTA passes. Since only 36% of the future needs are projected to be funded, this category receives a letter grade of D.

Funding and Future Need Grade: D

Operation and Maintenance

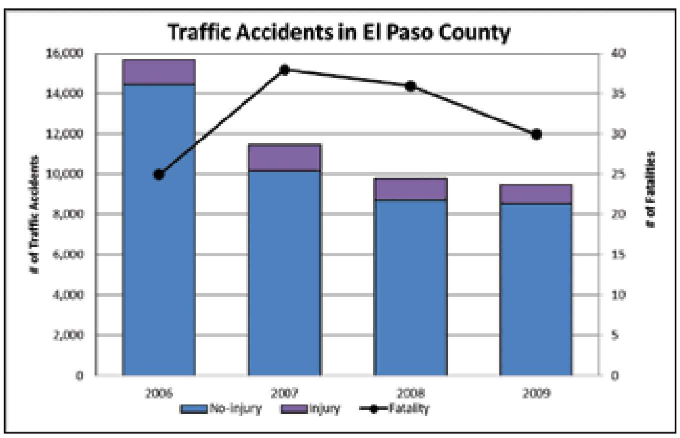
PPACG estimates that the current backlog of needed roadway maintenance is in excess of $500 million and the backlog of bridge and major sign structure maintenance is $400 million. This combined backlog is forecast to grow to $3 billion by 2035 according to PPACG. The PPRTA currently provides between $22 million and $25 million each year for maintenance. Based on the large gap between available funding and needed maintenance, this category receives a letter grade of D.

Operation and Matainance Grade: D

Public Safety

Crash data collected throughout the region shows that the number of traffic crashes has been steadily decreasing despite the fact that the volume of traffic and vehicle miles traveled are steadily increasing. The below chart is excerpted from the Moving Forward Update.

FIGURE 10-4: EL PASO COUNTY MOTOR VEHICLE CRASHES BY SEVERITY (2006-2009)



In 2010, the statewide crash rate on CDOT roadways was 198.56 accidents per million vehicle miles traveled according to CDOT's 2011 Fiscal Year Annual Report. The Pikes Peak region total crash rate was 45.774 accidents per million vehicle miles traveled in the years 2006 – 2010.

Due to the trend of decreasing traffic crashes despite increased travel, this category receives a letter grade of B.

Public Safety Grade: B

Resilience

Resilience is one of the key indicators an infrastructure system's quality. As discussed in earlier sections of this report, infrastructure resilience refers to the capability of a system to prevent or protect against significant multi-hazard threats and its ability to rapidly recover and ensure continuity of critical services, with minimal negative impact to the public health and safety, following a catastrophic event. Using the approach discussed in the Bridge section, the Colorado Springs area roads system's resilience was evaluated with respect to four key qualities: robustness, redundancy, resourcefulness and rapidity.

For an infrastructure system to exhibit resilience, it must be strong enough to endure an elevated level of stress. This is called robustness. When catastrophic events such as an earthquake, flood, wild fire or terrorist attack occur, an infrastructure system that is robust will be able to continue its original function without failure. This does not necessarily imply that the system won't experience decreased performance for a period of time, but does infer that the system can continue operating at some minimum level of performance. The recent wildfires on the City's northwest side were a test to see how the roadway system could handle roadway closures. The largest impact to the region's roadway network was the closure of US 24 through Ute Pass connecting Colorado Springs to the Woodland Park area. Long detours were needed to get through the area. However, this is to be expected in a mountainous area where there are less opportunities to build roadways.

The second key indicator of an infrastructure system's resiliency is its redundancy. If part or all of the system is destroyed or disabled, there must be alternate means of providing some continuing minimum level of that system's service. The closer the alternate service level is to the original service level, the greater is the system's redundancy. The vast majority of the vehicle miles traveled through the region are along I-25. I-25 is the only limited access freeway facility in the region that travels north/south. If a major incident were to happen along I-25, there would be significant congestion throughout the region due to the lack of parallel routes with adequate capacity to handle the I-25 demand. Additionally, there is no east/west freeway facility in the region. Several arterial roadways are being upgraded to provide additional capacity. While our road system's redundancy compares favorably with outlying rural areas, where loss of a roadway could cause long detours such as with the closure of US 24 through Ute Pass, it does not compare favorably with other urban areas where there is more than one interstate or freeway type facility to accommodate large volumes of traffic.

When critical infrastructure systems are damaged or destroyed, the quality of the response has a significant

impact on the system's resilience. What level of resources are available, and how effectively can they be marshaled and committed to repair or replace the affected system? The ability to commit the right resources in the correct manner in response to a catastrophic event defines the system's resourcefulness. Flexibility in problem solving and decision making by officials responsible for the infrastructure system, as well as planning for and a willingness to share resources across jurisdictional and organizational boundaries are key components to obtaining and maintaining a resourceful infrastructure system. As discussed in previous sections, the Waldo Canyon Fire during the summer of 2012 demonstrated the strength of Colorado Springs area and El Paso County government agencies, as well as the population in general. This community resourcefulness applies to the management of its roadway infrastructure system.

The final key indicator of infrastructure resilience is rapidity. Rapidity is an infrastructure system's ability to recover quickly from damage or failure. Rapidity depends on effective preplanning, availability of manpower, materials and equipment, efficient communications, and timely decision-making. For reasons similar to those described in the discussion of resourcefulness, rapidity can be considered a strength with respect to the Colorado Springs roadway infrastructure system.

The resilience grade of the region's roadway system is a C due largely to the lack of redundancy of high volume freeway or interstate facilities.

Resiliency Grade: C

Summary

Overall, the system's roadway system receives a grade of D. While roadway condition, ability to fund future needs, and operations and maintenance are low points, the current capacity and safety of the region's roadway system are high points. These high points are largely the result of over seven years worth of the PPRTA program improving the safety and capacity of the region's roadway network. The overall grade was determined by averaging the six categories with even weights. Grades for each category were given the following scores:

Category	Grade	Score
Capacity	C	75
Condition	D	60
Funding/Future Need	D	60
Operations and Maintenance	D	60
Safety	B	85
Resilience	C	75
Average	D	69

Recomendations

1. Condition, Funding, Future Need, and O&M all recieved D grades. The most immediate way to address these deficiencies is for our citizens to support extension of the Capital Improvement portion of the PPATA funding mechanism in the November 2012 election.

2. The City of Colorado Springs should consider creating its own capital improvement plan and funding source to supplement the PPRTA program. As shown in this report, there is a large funding shortfall even if the PPRTA Capital Improvement portion is extended by the voters. The City should also consider using a more stable funding source than sales taxes for any future transportation funding such as an increased mill levy on property taxes.

3. The Federal gas tax is 18.4 cents per gallon and has not changed since 1993. The Colorado gas tax is 22 cents per gallon has not changed since 1991. As vehicles have become more fuel efficient, the Federal and state government are receiving less revenues from gas taxes every year. A new model for funding transportation is desperately needed on both a Federal and statewide level.

Stormwater

Overall Grade: D-

The City of Colorado Springs contains the largest component of stormwater infrastructure in the Colorado Springs metro area. As a result, it was considered to be the best starting point to develop an infrastructure grade for the greater Colorado Springs area. Additionally, the information used to conduct this evaluation was more abundant and accessible from the City of Colorado Springs than from other municipalities in the region.

The Colorado Springs elected officials and city staff members have been creative and responsive when faced with stormwater-related challenges. There is a "can do" attitude and willingness to work with adjacent jurisdictions and communities that contributes to maintaining a largely effective stormwater system despite the challenges of operating in an environment of significantly constrained resources.

Stormwater conveyance systems are a critical component of municipal infrastructure. These systems safely convey stormwater to major drainageways and, as a result, reduce flooding risks in urbanized areas. Without stormwater infrastructure, private homeowners businesses, public structures, pedestrians and vehicular travellers would be in greater danger of flood catastrophes.

During the rainy seasons, stormwater infrastructure provides protection against flooding for most streets and structures. Most stormwater infrastructure is hidden under streets and most drainageways are not highly visible due to their locations. Most of the damage caused by storm events consists of erosion that occurs within drainageways. Additional damage that occurs consists of inlet clogging, roadway overtopping, and localized flooding. Some infrastructure failures occur due to the age or condition of the structure. It is normally up to the local municipality to repair these damages.

Exclusions

This report card was developed based on available information and committee members' professional knowledge of the subject within the constraints of limited resources. The following exclusions were identified, but not evaluated. Additional evaluations could be completed as a part of an updated version of this report card and with additional resources.

- Impaired Streams
- Water quality ponds
- Public perceptions of needs
- Emergency repairs funding
- Cost data analysis
- Future Capacity

Capacity

The grade for this component was based on the ability of major drainageway structures, including roadway crossings, to safely convey flood flows, thereby reduce risks to existing properties within the 100-year floodplain. The likelihood or probability of an event with a specified intensity and duration is called the return period or frequency. The intensity of a storm can be predicted for any return period and storm duration, from charts based on historic data for the location. The term 1 in 10 year storm describes a rainfall event which is only likely to occur once every 10 years, so it has a 10 percent likelihood any given year. The term 1 in 100 year storm describes a rainfall event which will occur with a likelihood of only once in a century, so has a 1 percent likelihood in any given year. There is approximately a 63.4% chance of one or more 100-year floods occurring in any 100-year period, not a 100 percent chance. Based upon the City of Colorado Springs GIS data, about 1,700 habitable structures are situated within the 100-year flood hazard area for the selected drainageways evaluated. Hundreds of residences are at risk for flood damage in a 10-year event. The risk extends to loss of public thoroughfares and utilities that could isolate neighborhoods and lengthen emergency response times. The under-capacity roadway crossings will cause localized roadway closures and potential damage to utilities, thereby causing disruption to utility services.

For the purpose of determining a grade, the drainageways evaluated included Sand Creek and its tributaries, Pine Creek, Camp Creek, North and South Douglas Creeks, Cheyenne Creek and Shooks Run. For each of these drainageways the major channel segments and roadway crossings were evaluated with respect to hydraulic capacity, or the availability the flood plan to safely carry the water to points of insignificant impacts. Since these are all major drainageways crossing major roadways, the 100-year FIS discharge was used to evaluate hydraulic capacity. Of the 67 major structures identified, only 40 had sufficient capacity to pass the 100-year discharge without overtopping the roadway being crossed and/or sufficient capacity to prevent flood flows from being forced out of the channel and into residential and commercial areas.

Capacity Grade: D-

Operations & Maintenance

The City of Colorado Springs conducts operational and maintenance functions on an emergency and stormwater permit requirement basis. While funding for operations is limited, basic federal, state, and local code required Municipal Separate Sewer Storm System (MS4) permit requirements are being met.

Colorado Springs was compared to four other Front Range municipalities or districts such as southeast metro stormwater authority, urban drainage flood central district, and City of Aurora with the following similarities:

- Serves populations greater than 200,000
- Has municipal drainage area greater than 100 square miles
- Has a Municipal Separate Storm Sewer System permit (MS4) issued by the State of Colorado, as required by the Environmental Protection Agency (EPA), or has assisted other municipalities with permit compliance through maintenance.

Each entity had a similar organization with goals, objectives, technical staff, maintenance programs, capital improvements programs, and agreements to work together on joint problems. However, the City of Colorado Springs was the only municipality that did not have a funding source to accomplish major maintenance and capital improvement projects.

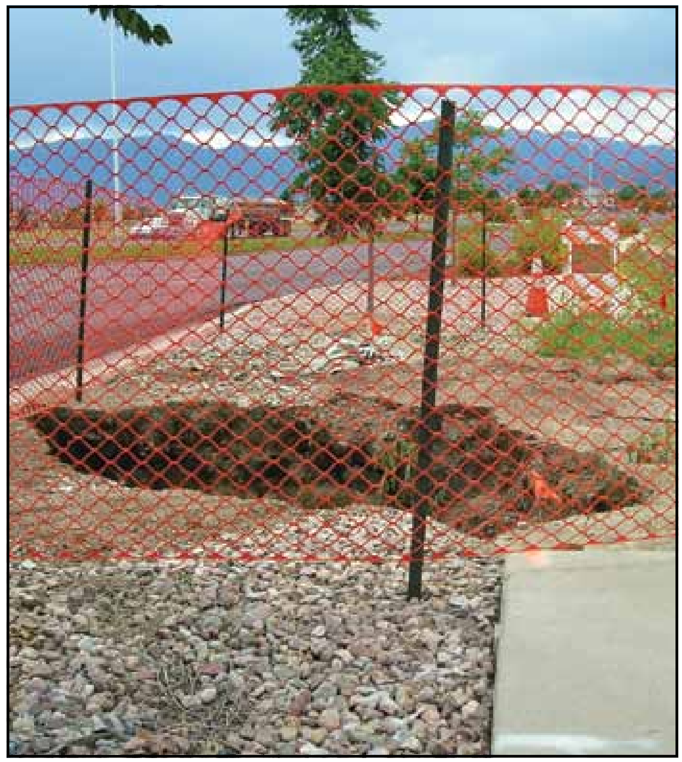
Operations & Maintenance Grade: D+

Condition

The grade for this component was based on information from the City of Colorado Springs existing capital improvement program, City inspector's data, Drainage Basin Planning Study (DBPS) recommendations, existing stormwater infrastructure condition, and the condition of existing drainageways.

The City has a review program for their stormwater infrastructure system. The City inspectors' Drainage Hazard Report of drainage infrastructure was reviewed and three categories of issues were identified: needed maintenance, erosion, and structure damage.

- Needed maintenance includes clearing brush, removing sedimentation, and replacement of flared end sections.
- Erosion issues include culvert or riprap undermining, and bank erosion of natural channels.
- Structure damage includes damage to concrete lined channels, drop structures, broken or damaged drainage structures, and needed pipe replacements.



Presently, the Drainage Basin Planning Studies (DBPS) for over 30 drainage basins are used to provide the overall planning efforts for Colorado Springs stormwater systems. These studies are used to define the major improvements required, potential environmental impacts, and estimated costs. The overall process has functioned relatively well to identify and build vital or emergency improvements, but it has not been perfect. An evaluation of the overall condition of Colorado Springs' stormwater facilities would need to include a review of existing facilities' relations to the overall stormwater planning efforts. An extensive, physical inventory of the area's stormwater resources would need to be accomplished to detail such improvements.

The evaluation of storm sewer infrastructure condition was limited to pipe infrastructure only and it was assumed that all other components to storm sewer systems (inlets, manholes, flared end sections, etc.) degrade at the same rate as the pipe itself.

The grade for storm sewer infrastructure within the City of Colorado Springs was developed by using parcel data to determine approximate age, inventory reports to determine approximate quantity, and several references to estimate service life. The percentage of remaining service life to total service life was calculated for each type of pipe material.

The weighted average percentage of remaining service life was then calculated for all three types of pipe for all ages.

The condition of the drainageway infrastructure directly impacts the risk of flood damage. Six selected drainageways that have the majority of the habitable structures within the 100-year floodplain were assessed for their overall condition. It was found that large segments of the selected drainageway are unlined and eroded now, or have hydraulic structures along them that are undermined due to years of degradation. Their poor condition increases the risk to the structures adjacent to them. The grade for this component was determined by assessing the total length of the channels that were unlined, eroded or wherever the top of the channel bank lies below the 100-year water surface and where overtopping could cause significant failure of the bank lining. From this assessment it was found that approximately 60 percent of total stream length was either unlined, eroded or subject to overtopping.

Condition Grade: F

Drainage Basin Planning Program and Funding

The grade for this component was based on budget information from the Drainage Basin Planning Study (DBPS) fee program.

Drainage Basin Planning Study (DBPS) – Is an engineering and planning study of a drainage basin which is tributary to a major receiving stream. The City of Colorado Springs has approximately 13 major basins, 23 receiving basins, and 139 designated drainage basins. A DBPS typically identifies engineering and planning needs for drainage appurtenances such as stormsewer conduits, channels, natural drainage courses, detention reservoirs, easements, culverts and all major hydraulic facilities required to control surface waters from the 100-year event within the basins and to carry such waters to points of significant impact. The studies also include an estimate of the cost of the facilities including the study. More detailed explanations regarding DBPS are listed in the City of Colorado Springs/El Paso County Drainage Criteria Manual which adopted by resolution these policies.

When a property is platted, the City collects drainage basin planning fees form developers, which are deposited in a basin fund account for future drainage improvements. The fees are not revenue, they are used only for drainage basinplan improvements. Some basin fees are currently inadequate to fund required drainageway plan needs, based on the available studies. Furthermore, most of the drainage basin planning studies need to be updated for current engineering practices/standards and to account for improvements that have or have not been completed. Each of the older studies requires services to determine if all the work has or has not been completed to its entirety. Due to inconsistent stormwater funding this work has not been conducted. An overall engineering regional planning program is suggested to evaluate the fee/infrastructure needs program to develop the program to be adequate for future drainage needs to be able to handle development impervious impacts.

For DBPS future development related improvements a summary of collections, fund balance, credits, future platted credits and future deficiencies of the programs are summarized below.

Future Development Related Improvements	
Collections of Projected Fee Total when Platted	$ 219,582,930
Basin Fund Account as of July 27, 2010 for Platted Properties	$ 2,386,157
Developer Platted land and Improvements Already Built and Approved for Credit	$ (14,722,180)
Future Developer Improvement Credits During Platted Process	$ (291,597,000)
Total Future Basin Fee Program Deficiency	$ (84,350,093)

Some projects identified in the planning studies as system deficiencies have not been confirmed as constructed after the land was platted and developed and are considered City obligations. Those liabilities are estimated at $355,171,000. An effort to evaluate each study's conformance must be conducted after updated planning studies are completed. The evaluation is a large time consuming effort and will require a consistent funding source.

The General Fund will provide $150,000 for this project, and the remaining $3,850,000 will come from grants, land donation and an in-kind match.

The City also has identified an additional $498 million in unfunded capital improvement stormwater projects. These projects include creek stabilization, bridge replacements, storm sewer replacement/additions, and pond improvements, including projects that have been carried forward since the 2006 budget.

The available funding divided by the needed funding is less than 1%. This is the grade for the Capital Improvements Program portion of the condition rating. The lack of funding contributes to the City's inability to replace and stabilize portions of the stormwater infrastructure.

Score: Available funding / Needed Funding = $4,000,000/$498,000,000 = <1%

The cost to provide for a higher level of capacity (ranging from 25-year to 100-year design levels) approaches the low end of the damage estimates for the flooding in the highest hazard drainageways in the City. At current funding levels, it could take decades for the drainageway infrastructure to be built to a greater level of protection. In the meantime, damages from flooding for even minor events may continue to occur along any of the selected drainageways every year. Because of this, the flood risk aspect should carry high consideration when determining the importance of adequate funding for drainageway infrastructure.

Historically the City has wrestled with the best way to provide adequate funding for stormwater capital improvement projects as well as maintenance

support. In 2005, the City Council voted to establish the Stormwater Enterprise (SWENT) for the purpose of overseeing the City's stormwater infrastructure system. As part of the SWENT initiative, the City also authorized a fee collection vehicle to provide funding for stormwater capital projects. In 2009, responsibility for funding stormwater system maintenance projects was also turned over to SWENT, but no funding increase accompanied this additional mandate. SWENT fees collected from 2007 to 2009 totaled approximately $43 million, and SWENT spent $21 million on stormwater capital improvement projects and $13 million on stormwater maintenance projects from 2007 to 2010. However, at the end of 2009, the City Council voted to phase out SWENT and eliminate the collection of SWENT fees. During SWENT's existence, progress was made in reducing the stormwater system project backlog, but the current estimate for the stormwater system backlog is approaching $500 million.

The current funding for improvements identified in the DBPS reports falls roughly $89M short, assuming the projected revenues are fully realized. Since there is no current funding mechanism beyond the basin fees, the $89M shortfall will only increase with time and neglect of the overall system. Since the average age of the current "approved" DBPS report is 1985 (over 27 years old) , most of the studies are likely outdated and probably do not meet current practices and regulatory requirements. As a result, additional costs will be required beyond those originally estimated in the DBPS.

Ultimately, there are no current revenue sources to fund O&M costs for the required improvements. An occasional allocation from the City General Fund or an emergency allocation from Colorado Springs Utilities (CSU) may address emergency critical and/or safety need, but there is no consistent source of funding for the City's overall stormwater needs. Overall grade for funding as compared to the need is 30%.

Funding Grade: F

Public Safety

The grade for this component was based on the flooding risk to existing properties within the 100-year floodplain compared to other major metropolitan areas in Colorado.

A considerable number of habitable structures are situated within the 100-year flood hazard area for the selected drainageways listed in the capacity section of this report. By reviewing the floodplain, it was found that approximately 1,700 habitable structures lie within the 100-year floodplain. Many of these same structures are at risk for events as frequent as the 10-year flood. The risk extends to loss of public thoroughfares and utilities that could isolate neighborhoods and lengthen the time for emergency response. FEMA data from 1978 to 2010 shows Colorado Springs having the largest number of claims filed of any municipality in Colorado, despite the fact that we did not experience a flood larger than a 25-year event during that period.

The primary function of a major drainageway system is to reduce the potential for flood damages and related risks to the general public. The selected drainageways will do little to protect adjacent property due to it's poor condition and limited capacity. The under-capacity roadway crossings will cause localized roadway closures and disruption to utility service. Because of the number of properties at risk, a high weighting factor was chosen for this rating component.

Public Safety Grade: D-

Resilience

As discussed in the previous section of this report, the resiliency of an infrastructure system can be evaluated by assessing four key infrastructure qualities: robustness, redundancy, resourcefulness and rapidity.

How robust is Colorado Springs's stormwater infrastructure system? Can it be subjected to an elevated stormwater demand and continue to operate effectively? The answer is somewhat of a mixed bag. The National Center for Atmospheric Research lists the 22 most damaging floods in recorded Colorado history, of which only two were in Colorado Springs. The 1935 Monument Creek flood killed 18 people, but occurred prior to construction of most of the current stormwater infrastructure system. The April 1999 flood, however, caused an estimated $15 million of damage in Colorado Springs, washing out bridges and roads, causing severe erosion, flooding homes and businesses, backing up sewers, and breaking a major sewer line. Not only did the stormwater system fail to protect bridges, roads and buildings, it also allowed more than 60 million gallons of untreated wastewater to pour into Fountain Creek, the primary drainage way flowing south out of the city.

The FEMA flood claims data described in the Public Safety section preceding this section provides an additional warning flag that the City's stormwater infrastructure system is brittle rather than robust. To summarize, the stormwater system performs adequately under normal to somewhat elevated flows, but is definitely vulnerable to extreme storm events. This indicates a lack of robustness in the system.

Redundancy is not a typical characteristic of most stormwater systems, and Colorado Springs's stormwater system is no exception. It is theoretically possible to achieve redundancy by providing regional detention facilities as a backup for local or on-site detention facilities, for example. This, however, is normally not done due to economic realities. Furthermore, alternate drainage ways are not a part of the Colorado Springs system. When the stormwater demand exceeds the capacity of a system component the result is generally flood damage and/or loss of use of adjacent infrastructure components, such as bridges or roads. Given the economic realities of stormwater system design and construction, redundancy cannot generally be considered a practical way to improve stormwater system resilience.

Colorado Springs's stormwater system resilience is, however, enhanced by local resourcefulness. There is no question that a nimble, resourceful municipal government contributes to the resilience of that jurisdiction's infrastructure systems.

Rapidity is closely linked to resourcefulness when assessing the resilience of an infrastructure system. Furthermore, both resiliency and rapidity depend on available resources to a significant degree. Unfortunately, while resourcefulness can be considered a strength of Colorado Springs's stormwater infrastructure system, the ability to rapidly repair damaged stormwater system components is hindered by a lack of resources.

Without a consistent method of funding stormwater maintenance and capital projects it stands to reason that the ability to rapidly respond to storm events and repair damaged stormwater system components is significantly impaired. This, in turn, has reduced the resilience of the Colorado Springs stormwater infrastructure system. Unfortunately, a decrease in resilience generally doesn't manifest itself until an extreme event occurs. If a 1999-type flood doesn't occur for another 20 to 30 years the chances are good that the general public will assume that all is well with the stormwater system.

Based on the discussion contained herein, certain conclusions can be drawn regarding Colorado Springs's stormwater infrastructure resilience. The system preforms adequately under normal conditions, but is distinctly vulnerable to extreme events. By definition, it is not a robust system. As is typical of most stormwater systems, it does not have built-in redundancy. The resourcefulness of those responsible for the stormwater infrastructure in Colorado Springs is a positive contributor to the system resilience, but the absence of a consistent funding mechanism significantly reduces the ability to rapidly respond to severe events and quickly repair resulting damage. As a result of these factors, the Colorado Springs stormwater system is lacking resilience. This lack of resilience is a latent vulnerability that will only become widely evident when the next extreme storm event occurs.

Resilience Grade: D

Recommendations

Based on the above, it is recommended that the City of Colorado Springs:

1. Establish a funding mechanism for stormwater related projects and stormwater systems maintenance.
2. Develop an informational program to educate the public on the importance of stormwater management.
3. Develop a detailed inventory of all stormwater infrastructure that includes type, age, and condition.
4. Develop, manage, and enforce a regional planning program.

Transit

Overall Grade: C-

Introduction

Mountain Metropolitan Transit (a division of the City of Colorado Springs) is the designated recipient of federal transit funds in the Pikes Peak region and therefore is responsible for working collaboratively with the Pikes Peak Area Council of Governments (PPACG) to develop a long-range transit plan for the region. This report describes existing transit services provided in the region and assesses how effectively they serve the existing and future travel needs of the region.

Overview of Existing Mountain Metropolitan Transit Services

The system grew out of the Springs Transit division originally established in 1976 and funded by the City of Colorado Springs and contracts with other jurisdictions. In 2005, with the passage of the Pikes Peak Rural Transportation Authority, the new Mountain Metropolitan Transit system was inaugurated to operate a portion of the regional services with dedicated funding from PPRTA. The City of Colorado Springs remains the operator and lead planning/contracting entity.

Mountain Metropolitan Transit services and funding have declined since 2008. In 2008, Mountain Metropolitan Transit provided approximately 3.8M passenger trips using $16.5M of local funding. In 2010, the MMT services declined from 2008 levels by 26%, providing only 2.85M passenger trips, with a 49% reduction in local funding to $8.4M. Estimated MMT service levels for 2012 will also be lower than 2008 by nearly 24%, providing an estimated 2.9M passenger trips, with a 40% reduction in local funding to $9.9M. Mountain Metropolitan Transit in 2008 included local and express fixed routes throughout the urbanized area, serving the City of Colorado Springs, Manitou Springs, Falcon, Fountain, Widefield, and Security. In 2008, MMT also operated express commuter routes, providing service from Colorado Springs, including FrontRange Express (FREX) to downtown Denver and Ute Pass Express to Woodland Park and Green Mountain Falls. Due to reduced funding, 2012 MMT service has been reduced to only providing local fixed route service and ADA paratransit service to the City of Colorado Springs, Manitou Springs, Widefield, and Security.

Mountain Metropolitan Transit serves many people that are transit dependent, either because they do not have a driver's license, they have disabilities that prevent them from driving, or they cannot afford an automobile. As these people live, work and recreate throughout Colorado Springs and the surrounding areas, the current system makes an effort to serve most of the major areas and activity centers. Additionally, military personnel, students from Colorado College, Pikes Peak Community College, and the University of Colorado at Colorado Springs add to MMT's ridership.

Metro Mobility is Mountain Metropolitan Transit's complementary ADA paratransit service. This service is offered to those that qualify for the service under the Americans with Disabilities Act (ADA) and have been certified as eligible. The service is provided within ¾ of a mile of all fixed-routes that Mountain Metro operates.

In addition to Metro Mobility ADA paratransit service, several other agencies also serve an important role in meeting the specialized transportation needs in the region. There are six primary providers of specialized services funded through Mountain Metropolitan Transit in the region in addition to Metro Mobility: Silver Key Senior Services, Amblicab, Community Intersections, Goodwill, ComCor, and Fountain Valley Senior Services. Additional details on these providers, along with fleet rosters, can be found in the "Human Services Transportation Coordination Study" prepared by the Pikes Peak Council of Governments.

Mountain Metropolitan Transit is also home to the Metro Rides program. Since 1979, Metro Rides (formerly Ridefinders) has been helping residents and businesses in the Colorado Springs area to try to save time and money through the following services: transit rider support, vanpooling, carpooling, bicycling, walking and teleworking. While this is an important support service provided by Mountain Metropolitan, this evaluation focuses on the fixed-route and paratransit services provided by Mountain Metro.

ASCE Report Card Methodology

This ASCE report card evaluates existing transit services to determine how well they are meeting the needs of the community today and their ability to meet the needs in the future. The evaluation is based on the capacity of the service compared to the demand, the condition of the fleet and facilities, funding, operations and maintenance, public safety and resilience.

Capacity

The capacity of the existing system is evaluated by looking at the number of routes operated by MMT, number of service hours operated by MMT, coverage of transit supportive area, days and hours of service, per capita ridership. The capacity to meet future needs is evaluated by looking at the relative ridership per capita rate, capacity to accommodate this ridership and the capacity to accommodate growth in newly developed areas.

Overall, the MMT family of services carried 3.8 million annual transit trips in 2008 (2008 NTD). With an urbanized area population of 438,000 people, this resulted in 8.8 trips per capita, far less than the peer average of 18.6 trips per capita. By 2035 the urbanized area is expected to increase to a population of 530,800 people. Maintaining the same per capita rate, annual transit trips would increase to 4.7 million.

Mountain Metro Fixed-Route Services

In 2010 Mountain Metropolitan Transit (referred to as Mountain Metro) operated 18 local fixed-routes and two regional express fixed-routes with service primarily focused around downtown Colorado Springs and the main transfer facility at the Citadel Mall. Since 2008, 11 routes have been eliminated to meet the City's budget constraints. Routes eliminated represent those that were considered underperforming or did not have sustainable funding in place. Evening and weekend service was also eliminated.

Most routes operate approximately 12 hours per day between 6 AM and 6 PM. In 2010 there were no services provided in the evening or on weekends. Limited Saturday service was reinstituted in 2011.

In 2010 Mountain Metropolitan Transit's fixed-route local services covered approximately 59% of the transit supportive areas. By 2035 those same services would only cover 45% of the transit supportive area.

Metro Mobility

Metro Mobility operated 61,300 services hours and carried over 140,000 riders in 2010. Metro mobility services are provided during the same days and hours as Mountain Metro fixed-route service. The service is provided along a 1.5 mile corridor (3/4 mile on each side) around all routes on which the fixed-route service operates. Ridership has increased dramatically since fixed-route services were cut in 2008. Metro Mobility provides service within ¾ mile of all local fixed-route lines. Because this service area is larger than the traditional ¼ mile service used for local fixed-route service, the existing paratransit services cover 79% of the transit supportive area today and only 63% in 2035.

Given the current trends, demand for paratransit service Mountain Metropolitan Transit will service a smaller portion of the population in 2035 than today.

Current Capacity Issues

- In 2010 41% of the transit supportive land uses are not served by fixed-route transit. This increases to 55% in 2035.
- No transit service is provided in the evenings, or on Sundays and there is limited service on Saturdays.
- Metro Mobility currently operates at and over capacity.
- Population growth is expected to increase demand for both fixed route and paratransit services. Much of the growth is expected to occur outside the current service area.

Capacity Grade: D

Condition

The condition of the service is evaluated by looking at the physical condition of the fleet, facilities and stops/ stations in the system.

Age of Fleet

Mountain Metro Fixed-Route Fleet

Mountain Metropolitan Transit's current fixed-route fleet consists of 42 buses including a 20% spare ratio and 17 services vehicles. In 2010 the average age of the fixed-route fleet was 4.5 years.

Metro Mobility Fleet

Metro Mobility operated with a fleet of 47 fleet vehicles that were 2007 or newer in 2010. The average age of the paratransit fleet was one year.

Condition of Facilities

Mountain Metro occupies a transit campus consisting of six buildings and an open bus canopy in the southeast area of Colorado Springs on Transit Drive. The average age of the facilities located at the transit campus is twelve years old with the oldest building being 30 years old and the newest being a year old. The average condition of the facilities at the campus is very good due to regular maintenance and upkeep.

Condition of Transfers/Stops

Mountain Metro fixed route service utilizes four major transfer locations along with over 1100 bus stops throughout the fixed route system. When FREX was operational, it utilized park-and-ride facilities owned by the state and maintainedby Mountain Metro. The average age of the amenities is approximately 12 years old with the general condition of the transfer locations and amenities at the stops being in good condition.

Condition Grade: B+

Funding

Funding is evaluated by looking at the current level of funding (from all levels of government) and comparing it to the estimated funding need.

In 2010 Mountain Metropolitan Transit had a budget of $16.65 million that were derived from a variety of sources. The majority of the funds come from federal grants ($6.8 million), fare revenues ($3.13 million), the rural transportation authority ($2.92 million), and the City of Colorado Springs ($2.27 million).

To maintain the same level of service provided in 2010 with the anticipated growth, the MMT budget would need to increase nearly 25%. This however, falls short of providing a reasonable level of service to the urbanized area and is not comparable to the level of service provided by peer communities. To achieve ridership numbers closer to those experienced by peer systems, and assuming that the budget per rider ratio would remain the same, the MMT budget would need to more than double to approximately $35 million annually today and to $43 million in 2035.

Funding Grade: D

Operation and Maintenance

Operation and maintenance is evaluated on MMT's ability to operate and maintain services properly and determine that the infrastructure is in compliance with government regulations.

Ability to Maintain and Replace Fleet

Mountain Metropolitan Transit follows FTA's guidance for replacing vehicles when they reach 12 years or 500,000 miles. Mountain Metro currently has programmed replacement funds for the existing fleet within the regularly scheduled FTA replacement guidelines.

Ability to Sustain Services

While MMT is currently able to sustain their current services, they are not able to provide adequate service to the urbanized area or meet the needs of the growing population with the current system.

Level Of Service

Mountain Metro currently provides limited services on Saturday and no service on Sunday. In addition, weekday services have less than desired frequencies. Together, with the evaluation of service coverage (described under Condition), these measures indicate that the level of Sevice of operation is substandard.

Operation and Maintenance Grade: D

Public Safety

Public safety is evaluated on how public safety would be jeopardized if the transit system failed.

Today the transit system (especially Metro Mobility) carries many people to activities and services they would otherwise not be able to reach. This includes medical appointments, grocery shopping, the pharmacy, and jobs. For the transit dependent population (those without another means of travel) failure of the system could result in use of emergency medical transport, increased medical issues or emergency room visits, and a loss of income.

The connectivity for full ADA compliance to all bus stops along many of the routes is incomplete. Mountain Metro continues to address the connectivity issue annually with projects to bring the existing stops up to standards but this will take several more years to complete.

Today, the MMT staff and fleet are used in emergency evacuation situations. Failure of the system would reduce the volume of people that could be evacuated from an area and would specifically reduce the volume of people in wheelchairs that could be evacuated as the fleet is 100 percent wheelchair accessible.

Public Safety Grade: C-

Resilience

Resilience is measured by the system's ability to minimize damage to public safety and health, the economy, and national security. The ASCE approach to measuring the system's resilience is to evaluate the system with respect to four key qualities: robustness, redundancy, resourcefulness and rapidity.

The first quality, robustness, is defined by the system's ability to continue its original function without failure during a catastrophic event. This does not mean that it won't experience decreased performance for a period of time, but does infer that the system can continue operating at some minimal level of performance. Given the size of the fixed-route and paratransit fleets (and qualified drivers) and the fact that they both have a minimum 20% spare ratio, the current system is considered relatively robust.

The second factor, redundancy, is evaluated by asking if part of the system is destroyed or disabled, if there is a means of providing some continuing minimum level of service. Because there are two relatively large fleets (and licensed drivers) associated with the system, there is also a level of redundancy built in. The destruction of a portion of the system would likely limit service to essential services such as medical transport only. While this would be inconvenient and could result in a loss of pay for people unable to reach their jobs, it would not be catastrophic.

The third factor, resourcefulness, is evaluated by asking what level of resources are available and how effectively can they be marshaled and committed to respond to a catastrophic event as well as the willingness to share resources across jurisdictional boundaries. The Waldo Canyon Fire clearly demonstrates MMT's ability and willingness to respond to a catastrophic event. MMT was part of a multi jurisdictional cooperative effort to evacuate the area with special attention to evacuation of a medical facility with a large number of people in wheelchairs.

The fourth factor, rapidity, is evaluated by the system's ability to recover quickly from damage or failure. It is closely related to the system's resourcefulness, as discussed above and is also a strength with respect to Mountain Metropolitan Transit.

Resilience Grade: B-

Transit Grade Determination

Each of the six grading components discussed above is weighted equally. Letter grades are assigned the following numerical values:

A	4.0	C	2.0
A-	3.7	C-	1.7
B+	3.3	D+	1.3
B	3.0	D	1.0
B-	2.7	D-	0.7
C+	2.3	F	0.0

Based on the letter grades given for each of the six evaluation components, the numerical average for the Colorado Springs area transit system is 1.8. Thus, according to the numerical conversion shown above, the transit system recieves an overall letter grade of C-.

Recommendations

1. The Pikes Peak Region should support the extension of PPRTA funding in 2012 and Mountain Metropolitan Transit should continue to seek creative ways to fund local and regional transit services.
2. Mountain Metropolitan Transit should work toward implementing service in transit supportive areas that currently don't have transit service.
3. Mountain Metropolitan Transit should identify funding and service mechanisms that will enable them to provide transit service to areas where substantial population and employment growth are anticipated.

Wastewater

Overall Grade: B

Introduction

Colorado Springs Utilities (Utilities) is a community-owned utility company that provides water, wastewater, gas and electrical services to its customers. In the late 1800's Colorado Springs residents approved bonding for the first sanitary sewer lines to be installed in streets and alleys. Today, Colorado Springs Utilities wastewater system is one of the largest systems in Colorado and is regulated under a single state-issued permit. Colorado Springs Utilities wastewater collection system consists of approximately 1,650 miles of pipe, 14 lift stations, and 30,000 manholes. Two separate wastewater treatment plants (Las Vegas Wastewater Treatment Facility and JD Phillips Water Reclamation Facility) give Colorado Springs Utilities a total treatment capacity of 85 million gallons per day. This wastewater infrastructure treats an average of 36 million gallons per day—less than half its capacity.

Fountain Creek serves as the primary discharge for the effluent produced from the Las Vegas Wastewater Treatment Facility. Since the mid-1990's, Colorado Springs Utilities has spent more than $140 million to upgrade its wastewater treatment plant and wastewater collection systems. Today, the water discharged into Fountain Creek is cleaner than the water already there for most constituents.

Through rehabilitation and water conservation efforts, Colorado Springs Utilities has extended the life of its existing wastewater treatment infrastructure system and minimized sanitary spills into local streams. Colorado Springs Utilities is the only utility in Colorado and one of the few in the United States that has a wastewater spill recovery program. It protects the environment in the event of an accidental wastewater spill and prevents it from reaching downstream neighbors.

The wastewater infrastructure for Colorado Springs receives an overall grade of B. While Colorado Springs Utilities wastewater infrastructure is in good to excellent condition, it will continue to require repairs and/or replacements to keep its aging infrastructure in top shape.

Evaluation Methodology

In the development of the report card grade for wastewater, the following six fundamental components of the infrastructure were considered:

- Capacity: based on long term planning.
- Condition: based on the age of the system.
- Funding: based on the ability to fund current and future system needs.
- Operation and Maintenance (O&M): based on staffing, planning and funding.
- Public Safety: based on safeguards that are in place.
- Resilience: based on robustness, redundancy, resourcefulness, and rapidity.

Each of these components were graded independently based on information received from interviews, raw data, annual reports, Colorado Springs Utilities website, and media releases. The individual scores were then used to calculate an overall score for the water infrastructure system.

Capacity

According to the 2008 Colorado Springs Utilities Wastewater Integrated Masterplan, which is currently being updated, the rated capacity of the Las Vegas

Wastewater Treatment Facility is 65 million gallons per day (mgd), whereas the base flow projection for the same time period is 35 mgd. Therefore, the Las Vegas wastewater treatment plant would not need to go through an expansion until well after 2030 based on historical population rates, influent flow data and future predictions.

Colorado Springs Utilities currently follows its 2012 – 2016 Strategic Plan/2012 Annual Operating Plan, which identifies projects and budgets for upcoming wastewater projects. In addition, Colorado Springs Utilities also follows the 2008 Wastewater Integrated Masterplan. Both plans identify capital improvement projects, some of which are required by regulatory requirements and some are required to improve efficiencies in the system.

Colorado Springs Utilities has demonstrated that they have long-term plans identified and in place to meet future demands.

Capacity Grade: A

Condition

A condition evaluation was conducted for the existing wastewater pipelines based on data provided by Colorado Springs Utilities. The evaluation of the wastewater pipelines provided a representative overall condition of the Colorado Springs Utilities wastewater system. A total of 230 miles of pipelines was evaluated. The age of the infrastructure evaluated included pipes as old as124 years. The diameter of the infrastructure evaluated ranged from 12 inches to 66 inches. Systems not evaluated were the wastewater systems smaller than 12 inches. An evaluation of pump stations, treatment facilities, and other wastewater facilities was not conducted. Additionally, this study did not evaluate manholes associated with the wastewater system. Figure 1 shows the pipelines categorized by age group evaluated. The condition grade is based on length-weighted average of pipeline age.

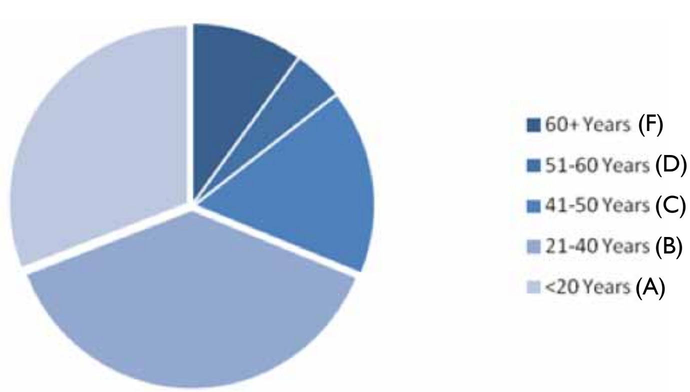


Figure 1: Wastewater pipeline age.

Typical collections system failures are caused by vandalism, tree roots, pipeline settling, grease blockages, or severe storm events. Colorado Springs Utilities cleans approximately one-third of the collection system per year. Closed-circuit TV is also used to monitor the condition of the collection system.

Condition Grade: C+

Funding

According to Colorado Springs Utilities website (www.csu.org), since 2004 Colorado Springs Utilities has spent over $147 million on wastewater collection improvements as part of $250 million capital improvement program scheduled to be completed in 2018.

With regards to emergency funding, Colorado Springs Utilities does have a small contingency fund available for emergencies associated with wastewater system failures. If the contingency funds are not sufficient, Colorado Springs Utilities has the ability to rebudget if necessary to meet the need of the emergency.

Colorado Springs Utilities has demonstrated that they have funding identified and in place to meet current and future needs, however emergency funding is limited.

Funding Grade: B

Operation and Maintenance

Colorado Springs Utilities has four major programs dedicated to wastewater improvements as shown in its 2012 – 2016 Strategic Plan and 2012 Annual Operating Plan:

- Sanitary Sewer Evaluation and Rehabilitation Program/Collection System Rehabilitation/Replacement – Evaluates and rehabilitates sanitary sewer pipelines 10-inches and larger.
- Local Collectors Evaluation and Rehabilitation Program – Evaluates and rehabilitates sanitary sewer pipelines 8-inches and smaller.
- Sanitary Sewer Creek Crossing Program – Assesses wastewater segments in or near creeks, then determines the best solution to mitigate risks associated with the creek crossing
- Manhole Evaluation and Rehabilitation Program – Assesses, rehabilitates or repairs the approximately 35,000 manholes in the wastewater collection system

Colorado Springs Utilities has a detailed O&M

program for its entire wastewater infrastructure including manholes, lift stations, force mains, and treatment facilities. This O&M program is an integral part of the 2012 – 2016 Strategic Plan and 2012 Annual Operating Plan.

Colorado Springs Utilities has demonstrated that they have many successful O&M and rehabilitation programs and budget in place, with appropriate budget considerations for forseeable needs. .

Operation and Maintenance Grade: B+

Public Safety

As a result of capital expenditures spent to mitigate risks associated with sanitary sewer overflows into Fountain Creek, Colorado Springs Utilities now has a very low overflow rate per mile of pipe. Most recently, Colorado Springs Utilities implemented emergency action response plans for all their water, wastewater, gas, and electric infrastructure. These plans included specialized training in emergency action response in coordination with local and regional authorities.

Colorado Springs Utilities also has its own Wildland Fire Team, which is comprised of employees dedicated to protecting the city's watershed lands and infrastructure and to provide regional support in the event of a catastrophic wildfire. This team recently joined efforts with local authorities to fight the Waldo Canyon Wildfire. Many water and wastewater facilities were also threatened by the fire. Due to the emergency action response plans in place and the efforts by the Wildland Fire Team and other firefighters, the water and wastewater facilities avoided damage due to the fires. It is anticipated the effects of the fire will continue for years to come and Colorado Springs Utilities is focused on minimizing those effects to its users.

Colorado Springs has also made big investments to control wastewater spills that could affect Fountain Creek. Between 1998 and 2006, Colorado Springs Utilities had approximately 13 sanitary sewer overflows (SSOs) per year. The SSOs were a result from a number of causes including, vandalism, storms, construction, and system failure. As a result of the SSOs, Colorado Springs Utilities initiated several programs to evaluate their entire wastewater collection system for needed improvements including assessing the capacity of major collector pipes 10 inches or larger in diameter. The SSO Response and Mitigation Planning Program began in 2005. This project focuses on the identification and exploration of alternatives to recover sewage spills and/or divert, store, and treat stream flows that contain sewage spills.

An important aspect of the program is the Fountain Creek Recover System. In order to protect downstream water quality from impacts associated with upstream wastewater spills, Colorado Springs Utilities sponsored the design of the Fountain Creek Recovery project in 2006. The purpose of this project was to divert raw water stream flows up to 110 mgd, including spill flow, from Fountain Creek, store it, pump it back to the existing Las Vegas Waste Water Treatment facility for treatment, and return previously stored raw water that does not contain any sanitary sewer spill to the creek in place of diverted flows.

Colorado Springs Utilities demonstrated that they have safeguards in place to prevent failures, in addition to their emergency action plans.

Public Safety Grade: B+

Resilience

For the wastewater infrastructure system to exhibit resilience, it must be strong enough to endure an elevated level of stress. This is called robustness. When a catastrophic event such as a pipeline failure occurs, the wastewater infrastructure system that is robust will be able to serving its customers without failure. Based on information presented herein, Colorado Springs Utilities wastewater infrastructure system is generally robust. However, the aging wastewater infrastructure reduces the overall robustness and indicates that the robustness margin is narrowing.

The second key indicator of an infrastructure system's resiliency is its redundancy. If part or all of the system is destroyed or disabled, there must be alternate means of providing some continuing minimum level of that system's service. Colorado Springs Utilities has demonstrated through its short term and long term planning projects that redundancy measures are an important aspect of the wastewater infrastructure.

The ability to commit the right resources in the correct manner in response to a catastrophic event defines the system's resourcefulness. The Waldo Canyon Fire during the summer of 2012 clearly demonstrated the strength of Colorado Springs Utilities and their resources to help fight the wildfire, especially in areas of valuable water infrastructure. This attribute applies to the operation and management of the wastewater infrastructure system and responses to issues that arise.

The final key indicator of infrastructure resilience is rapidity. Rapidity is an infrastructure system's ability to recover quickly from damage or failure. Rapidity depends on effective planning, availability of manpower, materials and equipment, efficient communications, and timely decision-making. For reasons similar to those described in the discussion of resourcefulness, rapidity can be considered a key strength with respect to the Colorado Springs Utilities wastewater infrastructure system.

Due to the strength of Colorado Springs Utilities planning, rehabilitation programs, and public safety, resilience must be considered a highlight when evaluating our wastewater infrastructure system.

Resilience Grade: A

Summary

Grades from each of the components evaluated above were weighted and combined using a decision model to generate the overall grade for the wastewater infrastructure system owned and managed by Colorado Springs Utilities. As shown below, the overall grade for wastewater is B. Weighing factors were determined by ranking individual criterion on a comparitive basis using pairwise analyses.

Primary Criteria	Weighting Factor	Letter Grade	Numerical Grade	Wighted Value
A – Capacity	24%	A	5.0	1.20
B – Condition	29%	B-	4.1	1.09
C - Funding	19%	B	4.5	0.86
D – O&M	9%	B+	4.7	0.42
E – Public Safety	14%	B+	4.7	0.66
F - Resilience	5%	A	5.0	0.25
Average		B		4.48

Recommendations:

1. Colorado Springs Utilities must continue to focus on several aspects to maintain service reliability and to prevent deterioration in their overall grade. This includes continuing to support rehabilitation programs identified above.
2. As many of their systems approach their design life, deterioration and failures will become more prominent without appropriate investments and planning now. Colorado Springs Utilities must continue to be proactive in their maintenance operations and repairs.

Sources:

3. References: Colorado Springs Utilities, Wastewater System Improvements, April 2012, http://www.csu.org/residential/water/Pages/wastewater.aspx
4. Colorado Springs Utilities, Wastewater System Improvements, April 2012, http://www.csu.org/residential/water/Pages/wastewaterimprovements.aspx .
5. Colorado Springs Utilities, Wastewater Integrated Masterplan, http://www.csu.org/residential/water/Pages/wastewaterplan.aspx
6. Allison, Tyler. Personal Interview, April 10, 2012.
7. Colorado Springs Utilities, 2012 – 2016 Strategic Plan and 2012 Annual Operating Plan, http://www.csu.org/residential/about/Documents/2012%20AOP%20and%202012-2016%20Strategic%20Plan%20Revised.pdf

ACKNOWLEDGEMENTS

COLORADO SPRINGS AREA INFRASTRUCTURE REPORT CARD COMMITTEE

Chair: Stan Rader, DE, PE
Department of Civil & Environmental Engineering
United States Air Force Academy

Public Information: George Hayward
The Home Front Cares/Independent PI Consultant

INFRASTRUCTURE CATEGORY COMMITTEES

BRIDGES		
Chair	**Advisor**	**Contributors**
Stan Rader, DE, PE U.S. Air Force Academy	Dan Krueger, PE AMEC Environment & Infrastructure (Formerly City of Colorado Springs)	
DRINKING WATER		
Chair	**Advisor**	**Contributors**
Stephanie Harrison, PE CH2M Hill	Bob Robler, PE Matrix Design Group, Inc.	Kyle Hinton CH2M Hill
ROADS		
Chair	**Advisor**	**Contributors**
Scott Barnhart, PE, PTOE NV5	Mark Andrew, PE Colorado Dept. of Transportation	Craig Casper, AICP Pikes Peak Area Council of Gov.
STORMWATER		
Chair	**Advisor**	**Contributors**
Lucas Babbitt, PE Matrix Design Group, Inc.	Tom Repp, PE City of Colorado Springs	*See table following
TRANSIT		
Chair	**Advisor**	**Contributors**
Steve Murray, PE Felsburg Holt & Ullevig	Andy Garton, PE City of Colorado Springs	Holly Buck, PE, PTP Felsburg Holt & Ullevig
WASTERWATER		
Chair	**Advisor**	**Contributors**
Stephanie Harrison, PE CH2M Hill	Bob Robler, PE Matrix Design Group, Inc.	Kyle Hinton CH2M Hill

GRAPHICS DESIGN TEAM

Eagle Graphic Group, Colorado Technical University
John Chlebus, Creative Director
Shawn Mitchell, Senior Designer
Dustin Glatz, Art Director

ORGANIZATIONS

American Society of Civil Engineers
Colorado Section of ASCE

ASCE SOUTHERN COLORADO BRANCH BOARD OF DIRECTORS

President	Stan Rader, D.E., P.E.	United States Air Force Academy
Vice President	Greg Sounder, P.E.	Terracon, Inc.
Treasurer	Liz Staten, P.E.	HDR, Inc.
Secretary	Ryan Mangino, P.E.	JDS Hydro Consultants
Government Affairs Committee	Scott Asher, P.E.	Wilson & Company, Inc.
Programs/Special Events	Melanie Jollett, P.E.	Matrix Design Group, Inc.
Membership	Ryan Feist, P.E.	Terracon, Inc.
Younger Members	Scott Schnake, P.E.	Colorado Springs Utilities

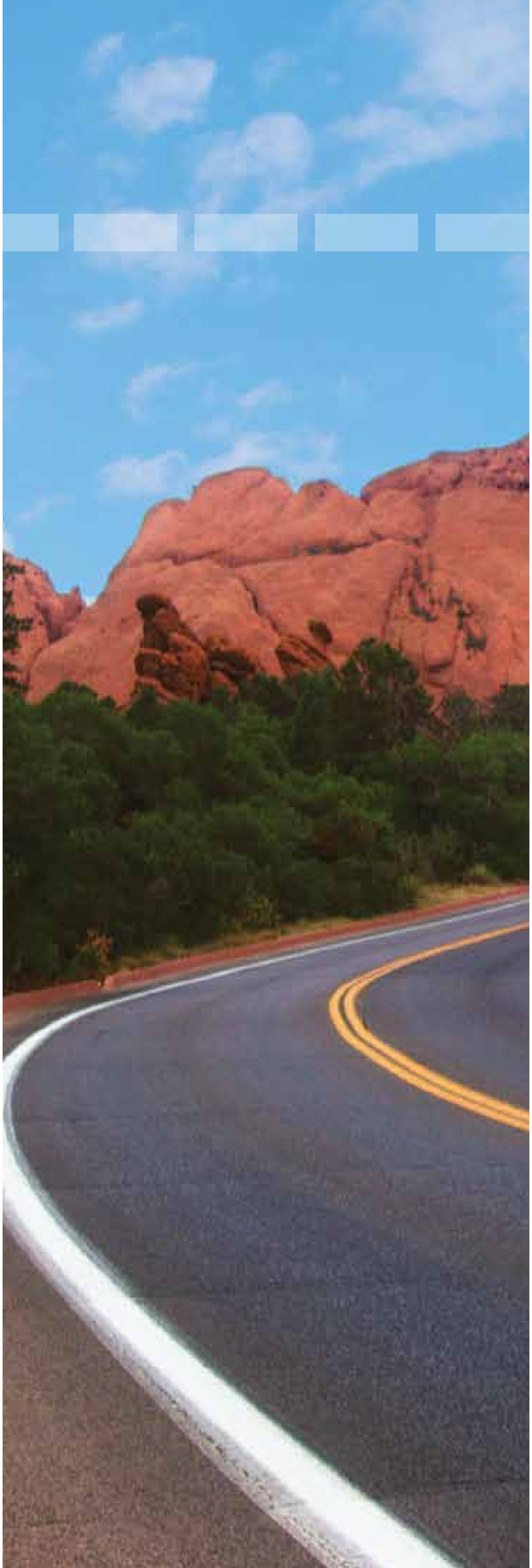
Acknowledgements Cont.

*Additional Stormwater Category Contributors
John Radcliffe, PE, NV5
Liz Staten, PE, HDR Inc.
David Longrie, PE, City of Colorado Springs
Rich Wray, PE, Kiowa Engineering
Ashley Byerley, Southeast Metro Stormwater Authority
Ken MacKenzie, PE, CFM, Urban Drainage and Flood Control District
Coleman Miller, PE, AMEC Environment & Infrastructure
Jill Piatt Kemper, PE, City of Aurora

NOTES

Notes

Notes



ASCE
COLORADO SECTION
Southern Colorado Branch

Contact Information: Stan Rader, D.E., P.E.

Phone: 719-333-7471

Email: stanley.rader@usafa.edu

Website: www.asce-scbranch.org