BRIDGES

ASSET MANAGEMENT PLAN

2025

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2.1	Jan. 2025	Updated format	Alfred Benesch / IPWEA	Rob Mosbey	Brad Buckman

This Asset Management Plan may be used as a supporting document to inform an overarching Transportation Infrastructure Strategic Asset Management Plan.

CONTENTS

1.0 STATE OF INFRASTRUCTURE REPORT (SOIR) CARD

1.1 Executive Summary

The City of Fort Collins (FC) initiated the development of a strategic asset management plan (SAMP) for effective management of the assets in six service areas: Road Network, Bridges and Culverts, Traffic Devices, Sidewalk Network, Railroad Crossings, and Transit. In addition to other components, the asset management system includes the development of an asset management plan for each of the six service areas. An asset management plan is developed following four steps: (i) define the state of the infrastructure, (ii) develop level of service goals, metrics, and existing performance, (iii) establish an asset maintenance strategy, and (iv) develop a financing strategy. This report discusses the development of the state of the infrastructure, or infrastructure report card, for the bridge service area.

The infrastructure report card for each service area is developed following four steps:

1. Capture asset inventory
2. Conduct condition assessment
3. Calculate age and remaining useful life
4. Complete asset valuation

A letter grade (A through F) was assigned to each service area to reflect its performance in relation to established level of service goals within the following categories: Condition versus Performance and Funding versus Needs. A third category was included for the Bridges and Culverts service area: Capacity versus Condition.

The Condition versus Performance category illustrates the average condition of all assets within that service area against the level of service goal(s). A letter grade of "A" indicates an average at or above what is specified within the goal, whereas an "F" signifies that the average condition is well below the established goal.

Condition vs. Performance		
Bridges and Culverts Rating	Letter Grade	Description
B	A – Very Good	New or recently rehabilitated; performance beyond goal.
	B – Good	Minor deterioration or defects; performance meets goal.
	C – Fair	Moderate deterioration or defects; performance slightly below goal.
	D – Poor	Serious deterioration or defects; performance well below goal, remediation required.
	F – Very Poor	Critical deterioration, possibly closed or out of service; performance yields asset unusable.

The Funding versus Needs category indicates how well the current level of funding allows the city to reach its level of service goals with respect to required asset replacement or rehabilitation needs. A letter grade of "A" represents a funding level at or above what is required by the level of service goals and may indicate an opportunity to strengthen goals. A letter grade of "F" indicates that a large increase in funding is required to meet the current level of service goals, or that the goals need to be greatly reduced based on current funding levels.

Funding vs. Needs		
Bridges and Culverts Rating	Letter Grade	Description
C	A – Very Good	Funding exceeds requirement for current goals; consider strengthening goals.
	B – Good	Funding adequate to meet current goals.
	C – Fair	Minor increase to funding required to meet current goals.
	D – Poor	Funding inadequate for current goals; consider reducing goals.
	F – Very Poor	Funding greatly inadequate for current goals; Goal revision or large improvement to funding source(s) required.

Capacity versus Condition, a metric specific to the Bridges and Culverts network, represents the ability of structures to efficiently carry traffic in relation to the controlling component condition rating. The referenced NBI items associated with this category are Deck Geometry and the lowest of either Deck, Superstructure, Substructure, or Culvert. Deck Geometry, rated from 0 to 9, is calculated based on roadway width versus average daily traffic on the structure. A score of 4 or lower depicts poor capacity performance, whereas a 9 represents a structure with excess traffic capacity. Comparing this rating against a structure's condition aids an owner in identifying infrastructure that may cause significant impacts to the movement of goods and services throughout the network. A Capacity versus Condition grade of "F" may indicate that a structure has sufficient capacity but whose poor structural condition may cause a closure in the near future, or that a structure is in good condition but due to poor capacity causes a bottleneck and possible delays for drivers. A grade of "A" indicates that both condition and capacity for the structure are currently beyond the needs of the network. It should be noted that the only ways to improve this metric are to increase a structure's capacity via redecking or replacement, or by improving a structure's condition through maintenance and/or rehabilitation efforts.

Capacity vs. Condition			
Bridges and Culverts Rating	DG + C	Letter Grade	Description
B	> 14	A – Very Good	Capacity and Condition exceed the needs of the network.
	≥ 12. ≤ 14	B – Good	Capacity and Condition meet the needs of the network.
	≥ 10, < 12	C – Fair	Capacity and/or Condition may cause impacts to the network.
	≥ 8, < 10	D – Poor	Capacity and/or Condition may cause significant delays or impacts.
	< 8	F – Very Poor	Capacity and Condition are threatening the ability to move goods and services through the network.

The bridge inventory is organized into five (5) asset categories: Major, Minor, Pedestrian, Less than 4-feet, and Unprogrammed. Major bridges include any structure owned or maintained by the city, longer than 20-feet in length, with the Minor bridge category capturing any city structure between 4- and 20-feet long. Pedestrian structures (most are maintained by other departments) are those of any length which do not carry vehicular traffic. The Less than 4-feet category is comprised of very small drainage structures spanning less than 4-feet in length. Unprogrammed currently captures a small number of structures that have not yet been categorized by FC. The cumulative bridge inventory includes 454 structures totaling 522,947 square feet of structure area, which is, on average, in good condition with useful service lives ranging from 45-125 years, and a replacement cost of $647.2 million. Presently, the bridge assets are well managed; however, there are areas for improvement. These are discussed in related sections, and recommendations are given towards the end of this report.

Bridge - Overall

522,947 Sq. Ft.

B – Good Condition

$ 647.2 Million

45-145 Years Useful Life

Major Bridges

346,349 Sq. Ft.

B – Good Condition

$ 307.1 Million

45-125 Yrs Useful Life

Minor Bridges

150,080 Sq. Ft.

C – Fair Condition

$ 228.6 Million

45-125 Yrs Useful Life

Pedestrian

> 26,518 Sq. Ft.

141 Structures

$ 50.9 Million

30-100 Yrs Useful Life

< 4 Feet

80 Structures

$ 60.6 Million

50-125 Yrs Useful Life

1.2 Approach

The State of Infrastructure Report (SOIR) card for the Planning, Development, and Transportation (PDT) service area is developed based on the following core asset management questions. Each question focuses on a specific aspect of the asset management domain. Each question results in creating a specific deliverable discussing and representing a fundamental component required for effective asset management planning. These deliverables are developed through extensive discussions held in meetings, workshops, and presentations.

- What assets do we own? (Asset Inventory Management):
  Refers to the identification, categorization, quantification, and recording of assets.
- What is the condition of assets? (Asset Condition Assessment):
  Refers to assessing the overall condition of assets in terms of the physical condition, capacity condition, and funding level. Due to limited information on the capacity and funding levels, only physical condition is considered in the assessment presented in this report. In subsequent revisions, all three factors will be considered in the asset condition assessment.
- Are the assets accessible? (Asset Accessibility Assessment):
  Refers to assessing the overall compliance of assets in terms of the Americans with Disabilities Act of 1990 (ADA).
- What is the expected Useful Life or Service Life of asset? (Asset Useful Life Expectancy):
  Refers to the expected useful life of assets is defined to estimate the remaining useful life that is required for asset management planning.
- What is the worth of assets? (Asset Valuation):
  Refers to the asset worth in terms of the asset replacement cost. The overall value of the asset portfolio is determined by estimating the cost required to replace them.

A detailed discussion is presented towards the end of the report to identify gaps in the current SOIR card and propose recommendations to address them.

Key stakeholders in the preparation and implementation of this AM Plan are shown in Table 1.2.

Table 1.2: Key Stakeholders in the AM Plan

Key Stakeholder	Role in Asset Management Plan
City Council	• Represent needs of community/shareholders, • Allocate resources and provide high level oversight to deliver strategic objectives and plans, • Ensure sustainable service delivery, • Communicate City strategic objective and measures.
City Leadership	• Ensuring council's policy direction through day-to-day management of city functions, including oversight of City operating departments. • Implementation of annual budget

Key Stakeholder	Role in Asset Management Plan
	• Ensure effective delivery of services consistent with council direction.
PDT Directors	• Communicate needs of community/shareholders, • Approve bi-annual budget offers to meet community needs and planning efforts, • Approve department strategy, policy, plans and procedures, and status of asset management program.
City Engineer	• Represent needs of Engineering Department to PDT Directors, • Assist with policy, processes, and budgets. • Assist with establishing levels of service
Capital Projects Manager	• Assist with development of objectives, measures, targets/goals, • Review budget to manage lifecycle costs, • Assist with establishing levels of service for asset infrastructure.
External Committees, Boards, or Groups	• Communicates with the community to identify and express concerns related to transportation issues, • Help develop or identify solutions related to levels of service, performance measures, or asset infrastructure.

1.2.1 Goals and Objectives of Asset Ownership

Our goal for managing infrastructure assets is to meet the defined level of service (as amended from time to time) in the most cost effective manner for present and future consumers.

The key elements of infrastructure asset management are:

- Providing a defined level of service and monitoring performance,
- Managing the impact of growth through demand management and infrastructure investment,
- Taking a lifecycle approach to developing cost-effective management strategies for the long-term that meet the defined level of service,
- Identifying, assessing, and appropriately controlling risks, and
- Linking to a Long-Term Financial Plan which identifies required, affordable forecast costs and how it will be allocated.

Key elements of the planning framework are:

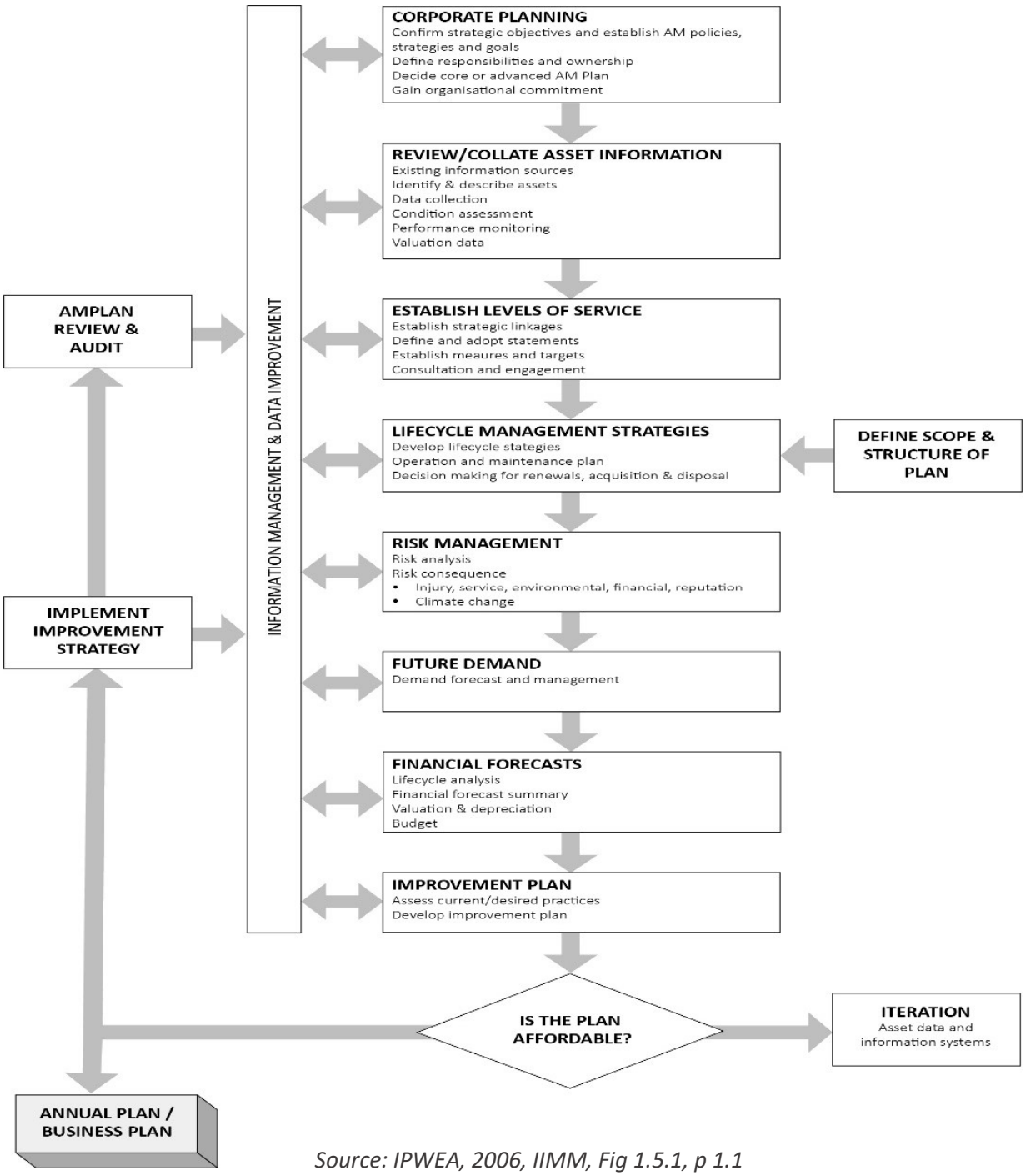
- Levels of service – specifies the services and levels of service to be provided,
- Risk management – what are the associated risks and consequences,
- Future demand – how this will impact on future service delivery and how this is to be met,
- Lifecycle management – how to manage its existing and future assets to provide defined levels of service,
- Financial summary – what funds are required to provide the defined services,
- Asset management practices – how we manage provision of the services,

- Monitoring – how the plan will be monitored to ensure objectives are met,
- Asset management improvement plan – how we increase asset management maturity.

Other references to the benefits, fundamentals principles and objectives of asset management are:

- International Infrastructure Management Manual 2015
- ISO 55000

Road Map for preparing an Asset Management Plan



Source: IPWEA, 2006, IIMM, Fig 1.5.1, p 1.1

1.3 Inventory

The City's bridge system is divided into five (5) asset classes: Major, Minor, Pedestrian, Less than 4-feet, and Unprogrammed. Each category is defined by either structure length or the typical traffic carried by the structure. Major, Minor, and Less than 4-feet categories carry mainly vehicular traffic, with some also carrying pedestrians and/or light rail. The Pedestrian category does not carry any vehicular traffic, only pedestrians. See Table 1 below for a breakdown of each asset category owned and/or maintained by Fort Collins.

Table 1.3: Bridge Asset Inventory

Bridge Asset Inventory			
Asset Category	**Quantity (No.)**	**Deck Area (Sq. Ft.)**	**Quantity with Missing Deck Area Values (No.)**
Major	93	316,296	0
Minor	135	135,204	0
Pedestrian	141	26,518	91
Less than 4-feet	80	-	80
Unprogrammed	1	-	1
Total	**450**	**478,018**	**172**

The missing deck area calculations for approximately one third of the city's bridge assets is an area recommended for improvement in future updates. While knowing the quantity of assets an owner is responsible for is important, understanding the investment required to maintain and/or replace those assets is key to establishing an actionable asset financing strategy. The discussion of quantity versus deck area is expanded upon further below.

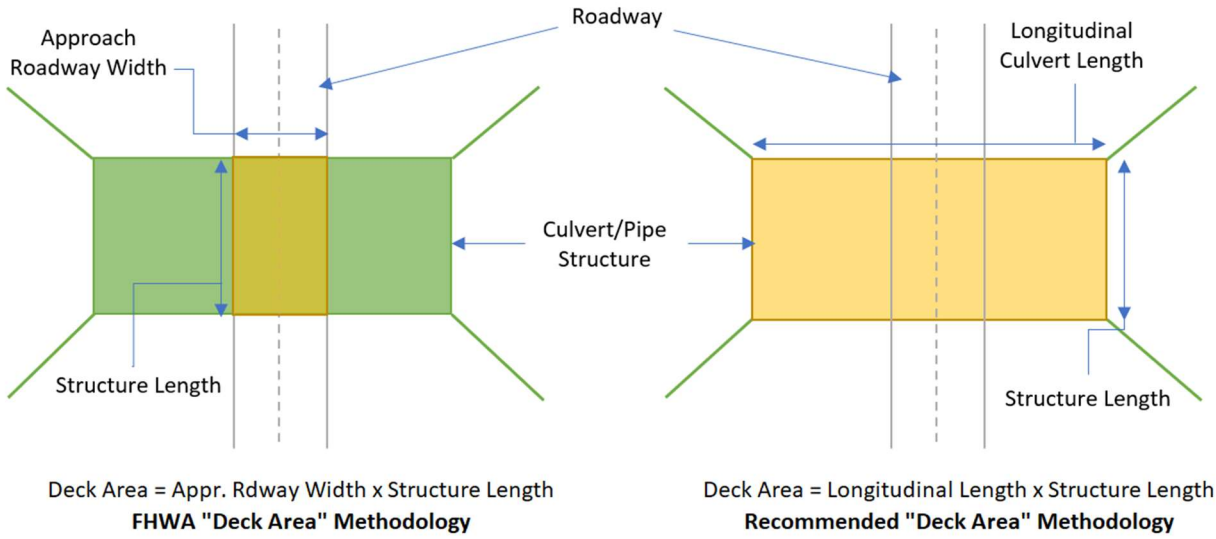
Per Colorado Department of Transportation (CDOT) and the Federal Highway Administration (FHWA) regulations, biennial, routine condition inspections are currently performed on all Major bridges at no more than 24-month intervals. Inspections are performed on the city's 141 pedestrian structures every 5 years. The inspection requirements and frequencies for the other bridge asset categories are regulated by Fort Collins as part of their agency best practices.

The FHWA evaluates the condition of the nation's bridge infrastructure in terms of square feet of deck area as opposed to the number of overall structures. This "footprint" approach to condition categorization and metric evaluation aids to describe the required investment (cost/square foot) and sized-based condition assessment (X square feet in "ABC" condition) based on overall bridge size instead of bridge quantity. For example, four small structures may constitute less deck area than a single, large signature bridge; evaluating network condition purely by the quantity of four smaller structures versus one larger structure may not reflect the true condition of the network or may mislead owners on investment requirements whereas utilizing deck area illustrates the actual structure footprint required for maintenance or replacement.

However, the FHWA method for measuring a structure's deck area has a caveat. For typical, open span bridges (i.e., slabs, girders, trusses), the calculation is straightforward: structure length multiplied by deck width (out-to-out). For culverts and pipe structures, FHWA's calculation is structure length (inside of

exterior wall to inside of exterior wall) multiplied by approach roadway width. This difference in calculations is because culverts do not have “decks” for which to measure, according to the National Bridge Inspection Standards (NBIS). This method of culvert deck area/footprint calculation is, more times than not, an underestimation of the actual structure footprint as the openings/headwalls of most culverts extend well beyond the vertical plane of the roadway curbs. It is recommended in future condition assessment/inspection tasks to collect the longitudinal measurements of each culvert or pipe structure, regardless of asset category, to improve upon the city’s bridge asset valuation. See Figure 1 for an illustration of each culvert calculation method.

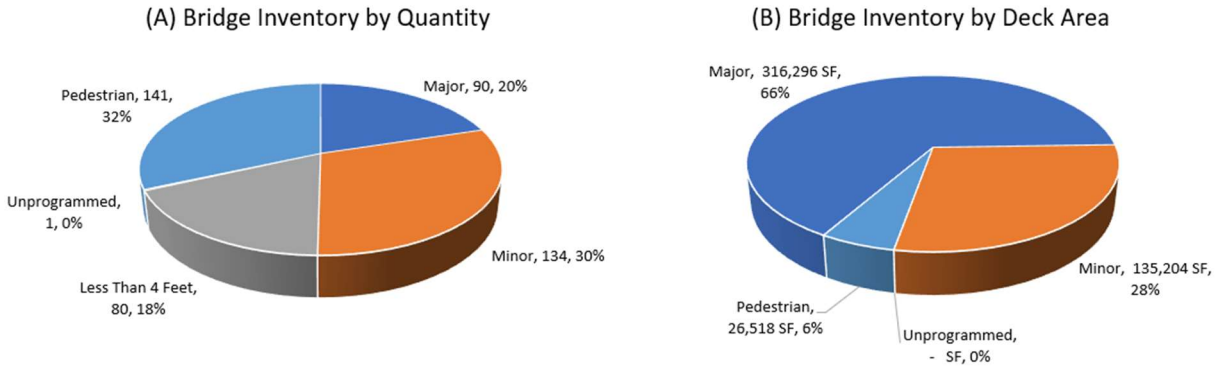
Figure 1. Culvert/Pipe Deck Area Calculation Methods



To meet federal guidelines, the city’s deck area metrics for the Major bridges category are reported to CDOT in square feet as calculated by the FHWA. Deck area calculations for the other asset categories, where available, are used internally for asset valuation and maintenance strategy purposes.

Figure 2(A) shows the detailed inventory distribution of bridge assets based on quantity, whereas Figure 2(B) represents the bridge inventory distribution by deck area. Note that while Major structures constitute only 20% in quantity of the city’s bridges, they make up over 65% of the overall deck area as defined by the FHWA. Maximizing the useful life of these structures and prioritizing their maintenance needs will have a significant impact on the asset management strategy.

Figure 2. Bridge Asset Inventory, (A) All Asset Types by Quantity, (B) All Asset Types by Deck Area



The main information source of the Major bridge assets is the inspection data collected by consultants during each biennial bridge inspection, as mandated by CDOT and FHWA. This data was collected per National Bridge Inspection Standards (NBIS) by National Highway Institute (NHI)-qualified bridge inspection team leaders for all Major structures within the city's network and uploaded to CDOT's database for future submittal to FHWA. Any changes to a Major bridge including, but not limited to, load postings, structural condition, and vertical clearance, should be reported to CDOT via email or by update to the database record. The information related to the Minor, Pedestrian, Less than 4-feet, and Unprogrammed structures are gathered by both consultants and/or city personnel on frequencies established by Fort Collins.

1.4 Condition

The asset management best practices emphasize the use of three criteria for condition assessment of assets, including age vs. physical condition, capacity vs. condition, and funding vs. need.

Physical condition data was collected during the routine bridge inspections and inspectors utilized the NBIS rating rubric to assign a numerical value to the appropriate structure components. These components include the deck, superstructure, substructure, and channel for an open span type structure, and culvert and channel for culvert or pipe structures. Each component is rated on a "9" (New Condition) to a "0" (Structure is Gone or Removed) scale. The type and scale of defects associated with each condition rating vary depending on the type of component being evaluated, however the severities of these defects are relatively equal between different structure types. For example, a "6" superstructure rating for prestressed concrete girders will reflect different defects than a "6" for steel girders, but the severity of these different defects is approximately the same. See Appendix A for the definition of individual defects associated with each condition rating and component type. To qualitatively categorize the deck area of a structure, the controlling (lowest) component rating (Channel is omitted) is used. Based on this value, the entire deck area of the structure is then assigned a condition category, see Table 2 below.

Table 1.4: FHWA Condition Categories

Controlling Structure Component Condition Rating	FHWA Condition Category
9	Good
8	

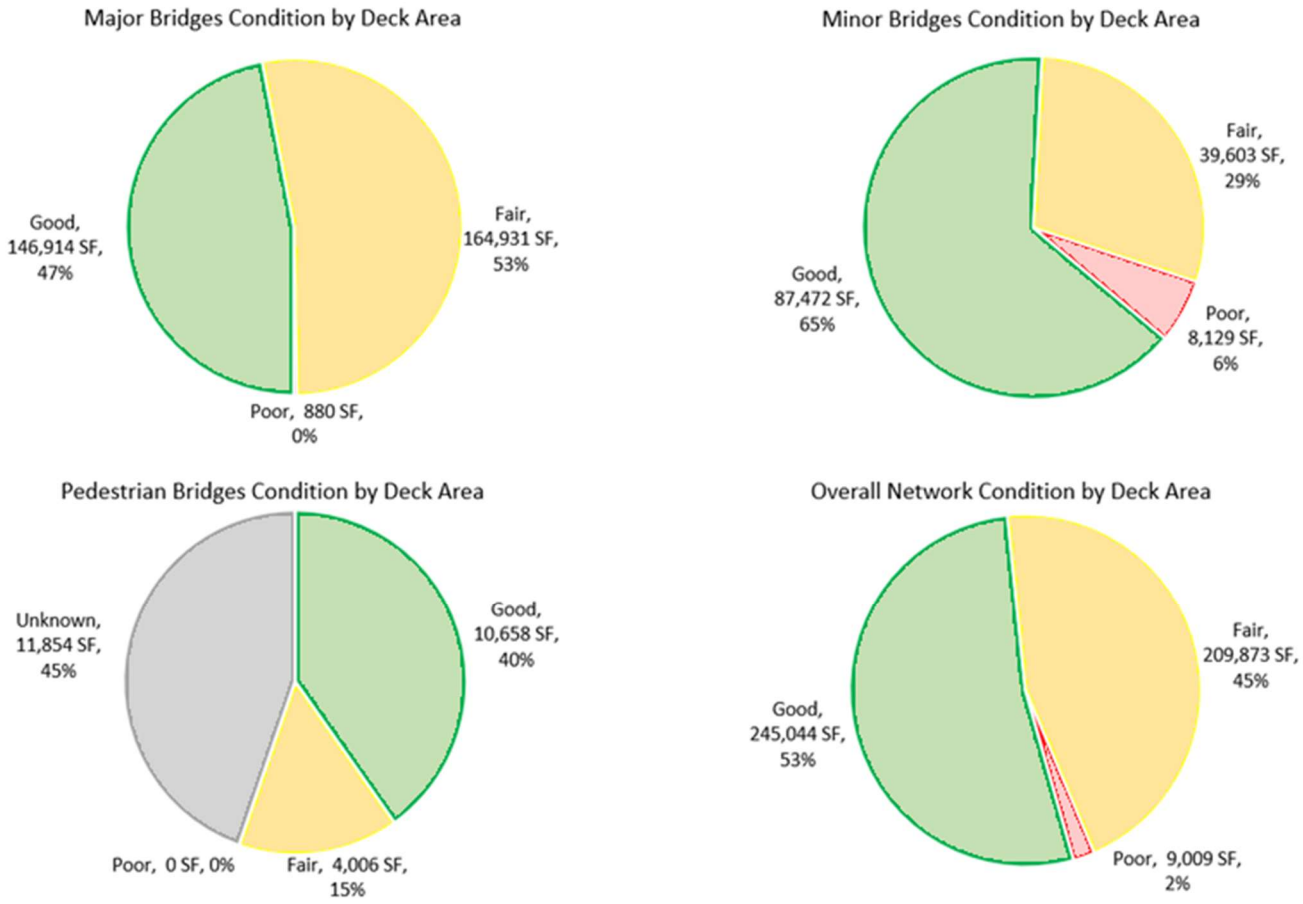
7	
6	Fair
5	
4	Poor
3	
2	
1	
0	

The FHWA's condition categories are used when CDOT reports the State's Major bridge condition data and is how the FHWA and DOTs across the nation often distribute infrastructure funding. Another method of defining the "health" of a structure is that of the Sufficiency Rating (SR). This percentage value, reported on all Major structures on a scale of 0% (Very Poor/Closed) to 100% (New, Excellent Structure), incorporates many different inspection data points in its calculation. While the Sufficiency Rating can be used as a rule of thumb for most structures, there are many instances in which it does not inform an owner of a glaring structural issue or deficiency. For example, a SR of 75% would lead an owner to believe a structure is in fair to good condition, however one large structural deficiency could be concealed within this score by numerous other high scoring geometric or traffic-related data points. Due to this lack of transparency, the Fort Collins SAMP will utilize scoring categories shown in Table 2 in lieu of relying solely on the Sufficiency Rating. See Table 3 below for a summary of how the controlling component rating relate to the deck area's condition category within the SAMP.

Table 1. SAMP Bridge Asset Condition Rating Summary

Condition Rating	Definition
Good Fit for the future (7-9)	The structure is in new to nearly new condition with only minor problems noted. Minimal routine and preventative maintenance required.
Fair Requires attention (5-6)	Moderate defects in primary structural elements. Structure requires significant maintenance and/or repairs.
Poor At risk (0-4)	Localized failures in primary structural elements likely. Structure components require major rehabilitation or renewal. Capacity or traffic reductions possible. Structure may be out of service and beyond corrective action.

Figure 3. Condition Assessment of Bridge Assets



Of the structures with measured deck area and available condition data, approximately 53% are in good condition, 45% in fair condition, and 2% in poor condition. It should be noted that out of the 450 structures listed in the city's inventory, 172 structures do not have deck area measurements. This missing data will have a large influence on the overall condition of the network, as well as the statistics for each individual asset category. Due to the lack of available condition and/or deck area data for the Less than 4-feet and Unprogrammed structures, no condition assessment was performed for these categories as part of this report. Effective bridge asset management strategies typically target keeping good bridges in good condition through the implementation of a preventive maintenance program. A rehabilitation program (minor & major) is also established to rehabilitate structures in fair and poor condition, respectively. Based on the availability of funds, bridges in poor condition are scheduled for reconstruction on either a short- or long-term basis.

Fort Collins manages the rehabilitation and replacement of bridge assets through capital projects, whereas the minor maintenance operations are managed by using internal resources. It is common practice by some organizations to minimize yearly funding and allow structures to "naturally" deteriorate until the end of their service lives upon which a full replacement will be scheduled. This practice may appear to be cost effective in the short term but has multiple detriments to the network and organization: levels of service suffer, the financial health of the organization is put at risk due to large variations in annual funding requirements as well as the eligibility of federal funding sources based on performances measures, and the

full extent of a structure's service life will rarely be realized without proper maintenance/rehabilitation. In lieu of defined level of service goals, the Bridge Network Replacement Profile (shown in Figure 5) was utilized to estimate current funding needs. This profile was developed using each structure's age and condition, then remaining life was extrapolated using the estimated service life of a given structure type (shown in Table 4). It should be noted that a structure is considered to be at the end of its service life when any component (deck, superstructure, substructure, or culvert) reaches a condition of "3". The replacement cost of each structure was then calculated (shown in Table 5) and attributed to its respective program year/decade. Based on a $1.7 million annual budget, and assuming that each structure is replaced according to the profile, it is recommended to increase the current funding level or identify external funding sources to aid during times of significant investment requirements. Once levels of service can be established, the city's infrastructure goals and funding requirements may be reevaluated and combined with a maintenance/replacement strategy that best serves Fort Collins' traveling public.

1.5 Life Expectancy

Asset life expectancy depends on a number of factors, including construction practices (poor vs. good workmanship), maintenance practices (proactive vs. reactive), treatment timing, and asset usage. When attention is not given to these factors, a bridge asset may deteriorate at an accelerated rate and its life expectancy may be much shorter. It is important for asset owners to establish and implement a comprehensive condition assessment program and treatment strategy to maximize the service life of a structure.

Utilizing historical condition ratings and structure performance results for bridge networks throughout the Midwest region, Benesch developed useful life estimates for FC's bridge assets based on asset category, asset component, and material as shown in Table 4. The ranges listed within each category represent the variability in asset performance due to numerous external variables that can affect a bridge component. These useful lives, and associated deterioration profiles, have been tailored for the Colorado region and their results have been corroborated by doctoral candidate research from the University of Missouri.

Table 2. Useful Life by Asset Type

Asset Category	Asset Component	Useful Life (Years)				
		Reinforced Concrete	Prestressed Concrete	Steel/Iron	Aluminum	Timber
Major	Deck	45-65	-	-	-	-
	Superstructure	60-80	60-90	75-125	-	-
	Substructure	65-125	-	-	-	-
	Culvert	60-125	-	-	-	-
Minor	Deck	45-65	-	-	-	
	Superstructure	60-80	60-90	75-105	-	-
	Substructure	65-125	-	-	-	-
	Culvert	60-125	-	45-85	35-75	-
Pedestrian	Deck	65-95	-	-	-	35-60
	Superstructure	45-75	-	50-75	45-65	35-60
	Substructure	50-100	-	-	-	45-75
	Culvert	65-100		-	-	-
Less than 4-feet	Culvert	50-125	-	-	-	-

Unprogrammed	Culvert	50-125	-	-	-	-

Note that estimated service lives in Table 2 are shown only for structures that contain current material/design type data in the city's inventory. The lower value of each listed lifespan can be interpreted as the anticipated service life with no maintenance or repairs performed; a "natural" service life. External variables, such as high traffic volumes, extreme weather events, and material defects, can further decrease this estimate.

Performing preventative and routine maintenance activities on a structure is a proven method of maximizing its useful life, and scheduling these activities at the appropriate time is vital to improving their cost effectiveness and maximizing the value of the city's investment. While a tailored maintenance and/or replacement strategy has yet to be implemented with the city, Table 3 below can serve as a general guide for when to perform which preventative and routine maintenance activities on each component of a structure.

Table 3: General Bridge Maintenance Guide

<table>
<tr><th rowspan="2">Condition Rating</th><th rowspan="2">Description</th><th rowspan="2">Maintenance Strategy</th><th colspan="4">Maintenance Activities</th></tr>
<tr><th>Deck</th><th>Superstructure</th><th>Substructure</th><th>Culvert</th></tr>
<tr><td>9</td><td>Excellent</td><td rowspan="3">PCL</td><td rowspan="3">Deck sweeping/ washing (1-2 years)
Drain/joint cleanout (1-2 years)
Crack and/or deck sealing (5-10 years)</td><td rowspan="3">Waterproofing membrane (5-10 years)</td><td rowspan="3">Waterproofing membrane (5-10 years)
Abutment debris/trash cleanout (1-2 years)</td><td rowspan="3">Debris, trash removal (2-4 years)
Channel cleanout (2-4 years)</td></tr>
<tr><td>8</td><td>Very Good</td></tr>
<tr><td>7</td><td>Good</td></tr>
<tr><td>6</td><td>Satisfactory</td><td rowspan="2">PCB</td><td rowspan="2">Repair, replace deck drains (25 years)
Joint seal replacement (15 years)
Joint replacement/ elimination (25 years)
Mill and overlay (30 years)</td><td rowspan="2">Structural steel painting (10-20 years)
Steel member repair (25 years)
Patch/repair concrete (10-15 years)
Bearing repair/replacement (35 years)</td><td rowspan="2">Patch/repair concrete (10-20 years)
Structural steel painting (10-20 years)
FRP wrap (50 years)</td><td rowspan="2">Scour countermeasures (10-20 years)</td></tr>
<tr><td>5</td><td>Fair</td></tr>
<tr><td>4</td><td>Poor</td><td>RR</td><td>Redeck (45-75 years)</td><td colspan="3">Full structure replacement (50-125 years)</td></tr>
</table>

Condition Rating	Description	Maintenance Strategy	Maintenance Activities			
			Deck	Superstructure	Substructure	Culvert
3	Serious					
2	Critical					
1	Imminent Failure					
0	Failed/ Closed					

Maintenance Activity (Recommended Interval)

PCL = Preservation / Cyclic Maintenance

PCB = Preservation / Condition-Based Maintenance

RR = Rehabilitation / Replacement

1.6 Valuation

Asset valuation refers to the worth of an asset or asset portfolio at any given point in time. It is a process of estimating the present worth of tangible capital assets like bridges and drainage structures.

Asset valuations assist city management in the following ways:

- Ensure compliance with regulatory requirements
- Represent the value of assets to stakeholders
- Measure organizational financial performance

The asset management best practices, guides, and manuals specify two approaches for asset valuation: net book value (used for financial reporting), and replacement cost (used for financial planning).

The net book value is determined based on the historical cost, which includes all the costs associated with the acquisition, construction, development, or betterment of assets at the time of ownership. The net book value is also determined based on the Generally Accepted Accounting Principles developed by the Governmental Accounting Standards Board (GASB) and is reported on the city's financial statements. Fort Collins's reported net book value covers the full scope of the city's tangible capital assets. The asset categories reflected in the financial reports are completely different than the ones developed as part of the asset management system. A reporting consistency between the financial and asset management systems is recommended to ensure understanding of programming impacts and effective communication regarding improvement planning. In the long term, this issue should be addressed.

The net book value is the original acquisition cost less accumulated depreciation, depletion, or amortization. As per the GASB requirements, all capital assets (including bridge assets) are depreciated using the straight-line method and reported annually in the city's consolidated financial statements. The report includes a cost valuation of the city's tangible capital assets accounting for amortization, write-downs, and betterments.

The net book value of the capital assets is determined by depreciating them annually to comply with the GASB financial accounting reporting requirements. In the domain of asset management, the net book value

is not used for the infrastructure renewal planning because many assets are long-lived and are fully depreciated in the financial statement yet still in service.

The replacement cost is the amount of dollar required at any given point in time to replace various tangible capital assets. The replacement cost valuation approach is preferred for asset management financial planning as it represents a true picture of the financial requirements for capital improvements. The replacement cost valuation is useful for assets having relatively long useful lives like water, wastewater, and transportation infrastructure. Compared to net book value, the replacement cost approach is more representative of future capital needs and more useful for decision-making. Replacement values are used to estimate potential investments for asset management purposes. The replacement values are the preferred indicator of cost used to estimate expenditures that will be required when assets reach the end of their useful lives.

To determine the replacement cost of assets, the city adopts the following three methods:

- **Local price indices**—represent the actual costs of recently completed similar replacement capital projects. In this approach, the city maintains the unit costs of all assets and applies across the asset base for replacement cost estimation. It is the most accurate and preferred approach to estimate the replacement cost of assets because it is based on recently completed capital projects taking into consideration inflationary and local impacts.
- **Published price indices**—represent industry-wide standard replacement unit costs of assets. The use of the published indices is appropriate; however, it doesn't consider the local factors. In the absence of the local price indices, the city uses published indices.
- **Accounting estimates**—use historical cost adjusted for inflation and estimated useful life to determine the replacement unit cost of capital assets. The city uses the accounting estimate in the absence of the local and published indices methods. The accounting estimates approach is the least preferred one.

The local price index approach is used to estimate the total replacement cost of bridge assets, as shown in Table 5 and Figure 4. It should be noted that the listed replacement costs are shown in 2022 dollars. Out of the total $256.1 million, Major bridges are $92.8M (36%), Minors $106.2M (41%), Pedestrian $42.4M (17%), Less than 4-feet structures $12.5M (5%), and Unprogrammed structures $2.2M (1%). As the Major and Minor structures account for more than three-quarters of the total replacement cost within the bridge network the maintenance and treatment strategy should be centered around maximizing their service lives to manage the network effectively.

Table 4. Replacement Cost of Bridge Assets

Asset Category	Main Material Type (if known)	Qty (No.)	Deck Area (SF)	Unit Cost ($/SF)	Construction Cost ($)	Cost Factor	Project Cost ($)
Major	Concrete Culvert	40	125,440	715	89,730,952	1.3	117,130,952
	Prestressed Concrete	21	49,987	780	38,974,960	1.3	53,674,960
	Reinforced Concrete	32	170,029	660	112,086,587	1.2	134,486,587
	Steel	1	893	200	178,600	2.0	357,200
	Subtotal	*94*	*346,349*		*240,971,099*		*305,649,699*
Minor	Concrete Culvert	88	110,743	1125	124,644,922	1.4	173,644,922

	Steel/Aluminum Culvert	8	5,503	150	825,450	2.5	2,063,625
	Reinforced Concrete	36	28,457	1,142	32,513,981	1.5	50,013,981
	Prestressed Concrete	5	4,994	180	898,920	2.25	2,022,570
	Steel	1	383	200	76,600	2.25	172,350
	Subtotal	*138*	*150,080*		*158,959,873*		*227,917,448*
Pedestrian	Steel/Aluminum/ Iron Truss	24	13,881	195	2,706,795	1.5	4,060,193
	Reinforced Concrete	1	336	170	57,120	1.5	85,680
	Concrete Culvert/Frame	1	70	160	11,200	1.75	19,600
	Timber	2	377	150	56,550	1.5	84,825
	Unknown	113	11,854	275,000*	31,075,000	1.5	46,612,500
	Subtotal	*141*	*26,518*		*33,906,665*		*50,862,798*
Less than 4-Feet	Unknown	80	-	576,923*	46,153,846	1.5	60,600,000
	Subtotal	*80*	-		*46,153,846*		*60,600,000*
Unprogram med	Unknown	1	-	450,000*	450,000	2.0	900,000
	Subtotal	*1*	-		*450,000*		*900,000*
Total		**454**	**522,947**		**$ 480,441,483**		**$ 645,929,945**

** Lump sum estimate used for structures with unknown deck area*

Figure 4. Replacement Cost of Bridge Assets

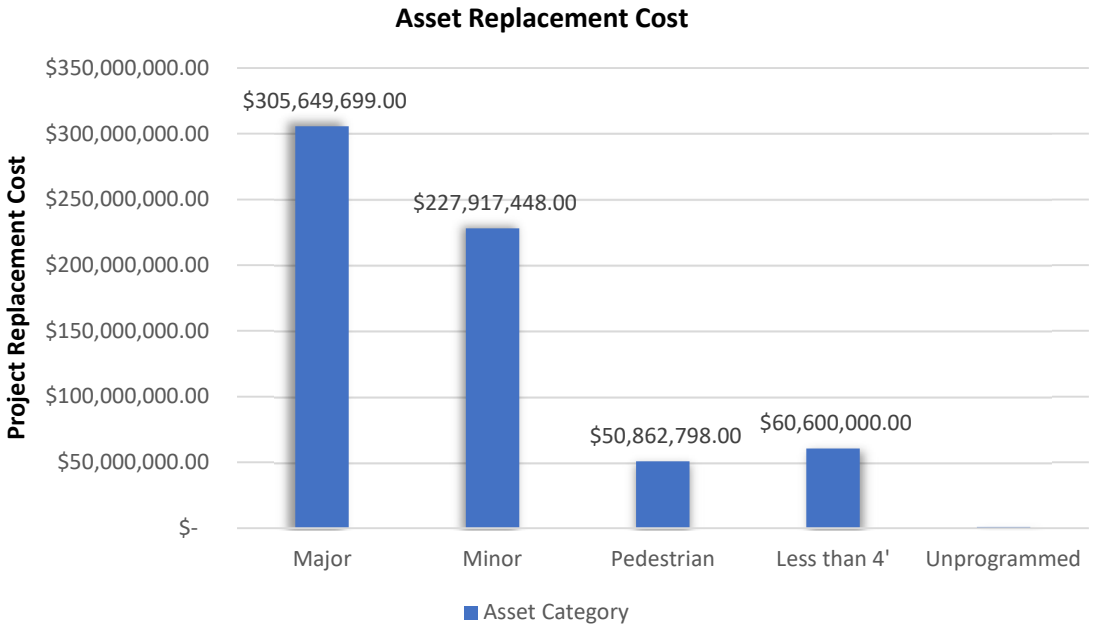
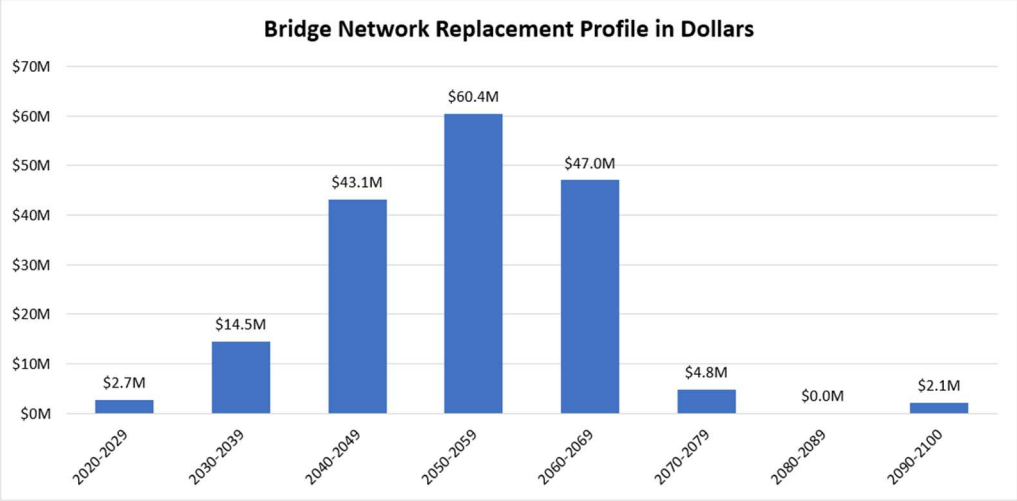


Figure 5. Bridge Network Replacement Profile



As shown by the asterisk in Table 4, the replacement unit costs for assets without documented deck areas utilize conservative lump sum values based on the asset category. It is recommended to measure the deck area of all structures owned and/or maintained by Fort Collins so that the bridge asset valuation may be refined and provide a more accurate estimate to the city.

The "Project Cost Factor" shown in Table 4 is intended to represent the additional cost variables beyond structural materials associated with a total bridge replacement project including, but not limited to, approach roadway replacement, utility relocation, traffic control, right-of-way, engineering design, construction inspection, and permitting. This factor is set to nearly twice the material cost for Major and Minor open span bridges as the additional project costs often make up a much larger portion of the overall cost due to smaller structure footprints. Conversely, the major bridges have very large structural material requirements relative to the other components of the replacement project and thus have smaller project cost factors.

1.7 Sustainability

According to the *City of Fort Collins City Plan* (April 2019), part of sustainability means "efficient management of our community's financial position and stability". Infrastructure plays a major role in a community's sustainability due to the large financial burden it represents from both a maintenance and replacement need. Neglecting or deferring infrastructure funding in an effort to support other community needs can have negative impacts on the ability for people, goods, and services to travel the city, compounding sustainability challenges further. Conversely, utilizing maintenance or replacement funds in an ineffective manner may place unnecessary financial burdens on other community programs. A sustainable bridge asset management program involves establishing realistic level of service goals that meet the needs of the community and maintain a safe, reliable infrastructure while efficiently utilizing available funding

sources, both internal and external. Future iterations of this asset management plan will expand upon the city's sustainability goals and metrics once plans for levels of service, maintenance and replacement strategy, and financial strategy are established.

2.0 LEVEL OF SERVICE (LOS) METRICS

2.1 Customer Level of Service (LOS) Metric

Customer Value	Organizational Level of Service Objectives	Customer LoS (Measures)	Cust. LoS (Perfor-mance)	Cust. LoS (Freq)	Cust. LoS (Target)	Data Source(s)	Target Source(s)
Quality Is the service of sufficient quality?	Provide high quality and well-maintained bridges	% of driving surface in Good or Fair condition	87.3%	Biennial	≥ 75% of network deck area	Routine bridge inspections	79.0% bridge roadway surface in Colorado; 2023 FHWA NBI Database
		% bridges in Good condition	52.6%	Biennial	≥ 70% of bridge inventory	Routine bridge inspections	35.1% bridges in Colorado; 2023 FHWA NBI Database
Quantity and Scope Is the service of sufficient quantity and adequate coverage?	Provide bridges to ensure reasonable connectivity of road network	% bridges with detour length < 5 miles *	95.3%	Biennial	≥ 60% of bridge inventory	Routine bridge inspections	71.7% bridges in Colorado; 2023 FHWA NBI Database
Legislative Does the service meet legal requirements?	Design, implement, and manage bridges in compliance with regulations	% compliance with CDOT inspection frequencies	100%	Biennial	100%	Operations	

Customer Value	Organizational Level of Service Objectives	Customer LoS (Measures)	Cust. LoS (Perfor-mance)	Cust. LoS (Freq)	Cust. LoS (Target)	Data Source(s)	Target Source(s)
Reliability/ Functionality How predictable is the service? How operational is the service?	Provide bridges that are functionally and structurally adequate	% bridges with vertical clearance ≥ 14'-6" *	100%	Biennial	≥ 80% of bridge inventory	Routine bridge inspections	99.73% structures in Colorado; 2023 FHWA NBI Database
		% bridges with adequate roadway width for ADT (NBI 68 ≥ 4) *	94.8%	Biennial	≥ 75% of bridge inventory	Routine bridge inspections	78.8% structures in Colorado; 2023 FHWA NBI Database
		% bridges with load postings *	5.7%	Biennial	< 10% of bridge inventory	Routine bridge inspections	4.2% structures in Colorado; 2023 FHWA NBI Database
Sustainability Does the service fits with future needs?	Provide bridges to support economic, social, and environmental needs	% bridges with sufficient waterway adequacy (NBI 71 > 5) *	100.0%	Biennial	≥ 90% of bridge inventory	Routine bridge inspections	68.6% structures in Colorado; 2023 FHWA NBI Database
		% bridges that are structurally deficient or functionally obsolete *	6.6%	Biennial	≤ 15% of bridge inventory	Routine bridge inspections	Total % SD/FO Bridges in Colorado; 2023 FHWA NBI Database
Accessibility Can the service be easily accessed and used?	Provide bridges to ensure connectivity of the road network for easy vehicular and pedestrian access	% bridges with safe approach alignment (NBI 72 ≥ 6) *	99%	Biennial	≥ 90% of bridge inventory	Routine bridge inspections	96.3% structures in Colorado; 2023 FHWA NBI Database

Customer Value	Organizational Level of Service Objectives	Customer LoS (Measures)	Cust. LoS (Perfor-mance)	Cust. LoS (Freq)	Cust. LoS (Target)	Data Source(s)	Target Source(s)
Health and Safety Does the service pose a risk to health and safety?	Provide bridges that are safe for all modes of travel	% bridges with railings aligned with current design standards (NBI 36A = 1 or N) *	39.5%	Biennial	≥ 40% of bridge inventory	Routine bridge inspections	52.4% structures in Colorado; 2023 FHWA NBI Database
Affordability/Cost Efficient Does the service offer best value for the money?	Plan, design, implement and manage bridges in an efficient manner	Annual cost (operating and capital) to plan, design and implement bridges ($/household) - Eng. Dept.	TBD	Annual	N/A	Finance / Operations	
		Annual operating cost to maintain bridge network ($/household) - Eng. Dept.	TBD	Annual	N/A	Finance / Operations	Prioritize Effective Treatment Strategies over Required Increase in Operations Needs
Customer Services/Responsiveness Does the organization promptly reply to customers?	Respond promptly to customers while providing and maintaining bridges	% customers satisfied with maintenance of major and minor bridges (as defined by AMP and per annual city survey)	TBD	Annual	≥ 60%	Annual City Survey	Strive for Majority of Respondents

Customer Value	Organizational Level of Service Objectives	Customer LoS (Measures)	Cust. LoS (Perfor-mance)	Cust. LoS (Freq)	Cust. LoS (Target)	Data Source(s)	Target Source(s)
		% of Access Fort Collins maintenance requests responded within 2 business days	100%	Quarterly	100%	Operations / Access Fort Collins Reporting	City Internal Goal

** Performance includes only Major bridges due to availability of data.*

2.2 Technical Level of Service (LOS) Metric

Customer Value	Organizational LoS (Measures/ Objectives)	Tech. LoS (Measures)	Tech. LoS (Perform-ance)	Tech. LoS (Freq.)	Tech. LoS (Target)	Data Source(s)	Target Source(s)
Quality Is the service of sufficient quality?	Provide high quality and well-maintained bridges	Deck area in Good condition	48.3%	Biennial	≥ 40% of network deck area	Routine bridge inspections	38.1% in Colorado; 2023 FHWA NBI Database
		Deck area in Fair or better condition	87.3%	Biennial	≥ 60% of network deck area	Routine bridge inspections	96.2% in Colorado; 2023 FHWA NBI Database
		Deck area in Poor or worse condition	12.6%	Biennial	< 50% of network deck area	Routine bridge inspections	3.8% in Colorado; 2023 FHWA NBI Database
Quantity and Scope Is the service of sufficient quantity and adequate coverage?	Provide bridges to ensure reasonable connectivity of road network	Maintain average LOS of roadways on structures	TBD	Biennial	100% of bridge inventory with roadway LOS C or better	Larimer County Urban Area Street Standards, Chapter 4	Min. LOS E; Table 4-2 (Fort Collins Motor Vehicle LOS Standards - Intersections)

Customer Value	Organizational LoS (Measures/ Objectives)	Tech. LoS (Measures)	Tech. LoS (Perform-ance)	Tech. LoS (Freq.)	Tech. LoS (Target)	Data Source(s)	Target Source(s)
Legislative Does the service meet legal requirements	Design, implement, maintain, and manage bridge network in compliance with regulations, organizational policies and procedures	Maintain compliance with bridge inspection standard	100%	Biennial	100% | Full Compliance	Routine bridge inspections	CDOT Structures Inspection & Management Requirements
		Ensure all structures have current load ratings	100%	Biennial	100% | Full Compliance	City bridge files	CDOT Structures Inspection & Management Requirements
		Maintain load posting signage at all required structures	100%	Semi-annual	100% | Full Compliance	Routine bridge inspections / Field verification	CDOT Bridge Load Posting Policy

Customer Value	Organizational LoS (Measures/ Objectives)	Tech. LoS (Measures)	Tech. LoS (Perform-ance)	Tech. LoS (Freq.)	Tech. LoS (Target)	Data Source(s)	Target Source(s)
Reliability/ Functionality How predictable is the service? How operational is the service?	Provide bridges that are functionally and structurally adequate	% deck area carrying Arterial or greater categorized as structurally deficient *	3.3%	Biennial	≤ 5% of network deck area	Routine bridge inspections	2.6% in Colorado; 2023 FHWA NBI Database
		% deck area carrying less than Arterial categorized as structurally deficient *	8.7%	Biennial	≤ 10% of network deck area	Routine bridge inspections	1.5% in Colorado; 2023 FHWA NBI Database
		% bridges with active Scour Plan of Action (POA) *	0.87%	Biennial	≤ 5% of network deck area	City bridge files	2.8% in Colorado; 2023 FHWA NBI Database
		% total Major bridge joint length in poor condition *	0%	Biennial	≤ 10% of total joint length	Routine bridge inspections	Typical threshold for other clients
		% bridges categorized as functionally obsolete *	5.2%	Biennial	≤ 15% of bridge inventory	Routine bridge inspections	18.0% Deck Area, 12.9% Total Bridges in Colorado; 2023 FHWA NBI Database

Customer Value	Organizational LoS (Measures/ Objectives)	Tech. LoS (Measures)	Tech. LoS (Perform-ance)	Tech. LoS (Freq.)	Tech. LoS (Target)	Data Source(s)	Target Source(s)
Health and Safety Does the service pose a risk to health and safety?	Provide bridges that are safe for all modes of travel	% bridges with sidewalks not meeting ADA compliance (4 ft wide) *	4.7%	Biennial	≤ 25% of bridges with existing sidewalks	Routine bridge inspections	2.1% in Colorado; 2023 FHWA NBI Database
Affordability/ Cost Efficient Does the service offer best value for the money?	Plan, design, implement and manage bridges in an efficient manner	Percentage annual reinvestment rate in bridge/structure service area	0.04%	Annual	1.3%	Finance / Operations	2016 Canadian Infrastructure Report Card
		Annual operating budget for bridge service area ($M)	$2.8M	Annual	$2.8M	Finance / Operations	Aligns with Customer - Affordability/ Cost Efficient Goal
Customer Services/ Responsiveness Does the organization prompt reply to customers?	Respond promptly to customers while providing and maintaining bridges						

3.0 DECISION MAKING STRATEGY

3.1 Background Overview

Figure 3.1: Decision Making Flow Chart

The general decision-making process is shown above in Figure 3.1. Detailed information for each step is outlined below.

3.2 Asset Inspection & Inventory

- Structures undergo a regular standard inspection cycle, which reveals the data used in prioritizing asset management. Standard inspection cycles depend on the type of structure inspected. A Major bridge is inspected biennially, and at no more than 24-month intervals. Pedestrian bridges are inspected every five years. The inspection requirements and frequencies of other bridge asset categories are regulated by Fort Collins.
- The bridge service area includes five types of assets: Major, Minor, Pedestrian, less than 4-feet, and Unprogrammed. The asset management strategy of the Bridge Service area is defined above and is used across the entire system, regardless of asset type.

3.3 Asset Prioritization

- The strategy for managing bridge and culvert infrastructure is primarily governed by Condition-Based Prioritization.
- The City of Fort Collins does not use sufficiency ratings and assesses condition levels by bridge elements:
  - Superstructure
  - Substructure
  - Deck elements
  - Culvert
- Under Condition-Based Prioritization, a Deck Geometry score is applied, which is calculated based on roadway width versus average daily traffic on the structure. The Deck Geometry/Condition Rating score ranges from 0 to 9, where a score of 4 and below is identified as structurally deficient, and a score of 9 represents a structure with excess traffic capacity.
- The final score of the bridge is defined by the lowest score of the individual bridge elements. Upon assessing those scores, a “Worst First” approach is taken regarding replacements.

- If, under the prioritization process, two different structures tie in score, then the next step is Risk Assessment. Risk Assessment includes analyzing and assessing the following items: traffic volumes, floodplains, financials, development, functional obsolescence, equity, and load postings. Upon finishing the assessment, the riskier structure will be prioritized.

3.4 Project Selection

3.4.1 Strategic and Corporate Goals

This AM Plan is prepared under the direction of the City of Fort Collins vision, mission, goals and objectives.

Our vision is:

"We foster a thriving and engaged community through our operational excellence and culture of innovation."

Our mission is:

"Exceptional Service for an Exceptional Community."

Strategic goals have been set by the City of Fort Collins City Plan and Strategic Plan. The relevant goals and objectives and how these are addressed in this AM Plan are summarised in Table 3.4.1.

Table 3.4.1: Goals and how these are addressed in this Plan

Goal	Objective	How Goal and Objectives are addressed in the AM Plan
Transportation & Mobility 6.1	Improve safety for all modes and users of the transportation system to ultimately achieve a system with no fatalities or serious injuries.	Reviews functionality and service capacity of bridges and identifies the necessary budget to improve those conditions.
Transportation & Mobility 6.5	Maintain existing and aging transportation infrastructure to keep the system in a state of good repair and continually address missing elements to meet community needs and expectations.	Reviews customer levels of service for lifecycle costing while balancing associated risks within the proposed budget.

3.4.2 Project Categorization

- Bridges in poor condition are scheduled for reconstruction on either a short- or long-term basis.
- Major and Minor structures account for more than three-quarters of the total replacement cost within the bridge network for maintenance and treatment, therefore the strategy should be focused on maximizing their service lives.

- There is currently no tailored maintenance and/or replacement strategy for Fort Collins that supports the asset management strategy, however a general guide is proposed in Appendix C.

3.4.3 Project Coordination

- The City of Fort Collins Streets Department handles deck maintenance through their regular pavement maintenance.
- Project coordination meetings occur twice a year. GIS information is provided with overlays of all projects.
- The Bridges Department may identify deck areas that need work and bring that work to the Streets department pending available funding in the Bridges Department.
- When proposed developments may impact bridges, coordination with the developer will proceed. Some developments may require rehabilitation, replacement, or expansion of existing bridge infrastructure

3.5 Forecasting

3.5.1 Financial Planning

- Financial planning for bridges is split into Renewal, Operations, and Maintenance Categories. The budget for bridge infrastructure work used to be higher, but has been reduced over time. The maintenance budget in particular has been reduced.
  - $2,100,000 annually for Renewal. The cost for renewal of bridge infrastructure is based on the square footage of the bridge, granting a unit price per area.
  - $400,000 annually for Operations, set aside to conduct inspections.
  - $300,000 (reduced from previous amount) annually for Maintenance.
- Replacement cost is used as best practice for financial planning purposes and Fort Collins uses the following three methods: Local price Indices, Published Price Indices, and Accounting Estimates.
- As of 2024, Total Replacement Cost is $648 Million. Major bridges consist of $307.1M (47%), Minor bridges consist of 228.6M (35%), Pedestrian bridges consist of $50.8M (8%), Less than 4-feet structures consist of $60.6M (9%) and Unprogrammed structures consist of $.9M (1%)
- Major and minor structures account for more than three-quarters of the total replacement cost.

3.5.2 Lifecycle Analysis

The design life of a bridge is used instead of the useful life of a bridge when prioritizing due to a lack of data. There is a degree of variability in whether the structures meet the design life for lifecycle analysis. Therefore, a design life of 75 years is applied for structures built after the year 2000, and 50 years for structures built before the year 2000.

3.5.3 Risk Management Planning

The purpose of infrastructure risk management is to document the findings and recommendations resulting from the periodic identification, assessment and treatment of risks associated with providing services from infrastructure, using the fundamentals of International Standard ISO 31000:2018 Risk management – Principles and guidelines.

Risk Management is defined in ISO 31000:2018 as: ‘coordinated activities to direct and control with regard to risk’.

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences. The risk assessment process identifies credible risks, the likelihood of the risk event occurring, and the consequences should the event occur. The risk assessment should also include the development of a risk rating, evaluation of the risks and development of a risk treatment plan for those risks that are deemed to be non-acceptable.

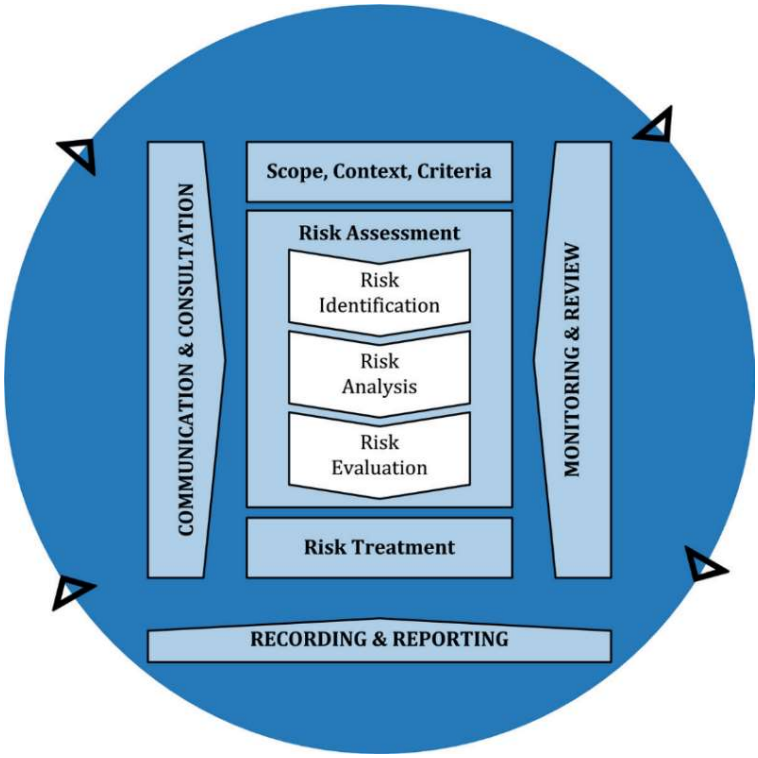
3.5.4 Risk Assessment

The risk management process used is shown in Figure 6.2 below.

It is an analysis and problem-solving technique designed to provide a logical process for the selection of treatment plans and management actions to protect the community against unacceptable risks.

The process is based on the fundamentals of International Standard ISO 31000:2018.

Fig 3.5.4: Risk Management Process – Abridged



Source: ISO 31000:2018, Figure 1, p9

The risk assessment process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, development of a risk rating, evaluation of the risk and development of a risk treatment plan for non-acceptable risks.

An assessment of risks associated with service delivery will identify risks that will result in loss or reduction in service, personal injury, environmental impacts, a 'financial shock', reputational impacts, or other consequences.

Critical risks are those assessed with 'Very High' (requiring immediate corrective action) and 'High' (requiring corrective action) risk ratings identified in the Infrastructure Risk Management Plan. The residual risk and treatment costs of implementing the selected treatment plan is shown in Table 3.5.3. It is essential that these critical risks and costs are reported to Planning Development & Transportation Directors.

Table 3.5.4: Risks and Treatment Plans

Service or Asset at Risk	What can Happen	Risk Rating (VH, H)	Risk Treatment Plan	Residual Risk *	Treatment Costs
Bridge Network	Mulberry Corridor Annexed Assets from Larimer County	VH	Cost Share, Budget Offers, Grant Opportunities, Road Network Funds, Highway Use Funds	M	Est. $12M
Bridge Network	Loss of Staff and their historic knowledge of the bridge program	H	Succession Planning – cross train project managers to manage bridge projects	L	$80,000
Bridge Network	Maintenance underfunding to maintain bridges in fair to good condition extending useful life	H	Budget Offers, Grant Opportunities, Highway Use Funds	M	$750,000 300,000 – approved budget offer for 2023/2024
Bridge Network	Flooding – Loss of Structures or bridge closures	H	Continue Inspection Frequency, Perform Required Maintenance, Reconstruct at Higher Flood Stage	M	$1.5M - $10M
Bridge Network	Critical Asset Replacements	H	Budget Offers, Grant Opportunities, Road Network Funds to renew structurally deficient bridges	L	$7M

Note * The residual risk is the risk remaining after the selected risk treatment plan is implemented.

3.5.5 Critical Assets

Critical assets are defined as those which have a high consequence of failure causing significant loss or reduction of service. Critical assets have been identified and along with their typical failure mode, and the

impact on service delivery, are summarized in Table 3.3.1 Failure modes may include physical failure, collapse or essential service interruption.

Table 3.5.5 Critical Assets

Critical Asset(s)	Failure Mode	Impact
Structurally Deficient Bridges (Major/Minor)	Without renewal of the 16 SD bridges failure or collapse is imminent.	Impact will disrupt community services, emergency services, school routes, and higher levels of traffic congestion on main roadways. Failure will also impact staff service due to required alternative routes.
Structurally Deficient Bridges (Major/Minor)	Weight Restricted	Alter the transportation of goods, emergency services, school bus routes, and staff service due to weight restrictions.
Structurally Deficient Bridges (Major/Minor)	Additional Services Required	Additional funding is necessary due to increased inspection frequency reducing available funding for operations, maintenance, and renewals.

By identifying critical assets and failure modes an organization can ensure that investigative activities, condition inspection programs, maintenance and capital expenditure plans are targeted at critical assets.

3.5.6 Infrastructure Resilience Approach

The resilience of our critical infrastructure is vital to the ongoing provision of services to customers. To adapt to changing conditions we need to understand our capacity to 'withstand a given level of stress or demand', and to respond to possible disruptions to ensure continuity of service.

Resilience recovery planning, financial capacity, climate change risk assessment and crisis leadership.

Our current measure of resilience is shown in Table 3.5.4 which includes the type of threats and hazards and the current measures that the organization takes to ensure service delivery resilience.

Table 3.5.6: Resilience Assessment

Threat / Hazard	Assessment Method	Current Resilience Approach
Bridge Closures	Condition Assessment	Continue to perform bridge inspections and prioritize any critical maintenance activities. Prioritize bridge renewals based upon risk assessment.
Maintain bridges in state of good or fair condition	Condition Assessment	Develop 10-year maintenance program for on-call bridge maintenance contractor to be reviewed annually after inspection period.
Scour Critical Bridges	Condition Assessment	Scour critical bridges should be prioritized first for maintenance to ensure footing stability

4.0 RECOMMENDATIONS

1. Measure and document culvert/pipe longitudinal length for all applicable structures in future data collection efforts.
2. Refine structure inventory information for all structures. Recommended priority data points include estimated age or year built, material type, design type, average daily traffic (ADT) carried by structure (including truck %), fill depth (culverts/pipes), and condition of paint system (steel girder and/or painted truss systems). While not required by the NBIS, these data points may serve to improve structure maintenance/treatment strategies and aid in refining maintenance scope/cost estimates.
3. Update replacement unit costs in future revisions using current local bids from contractors (local indices) to maintain accurate asset valuation. Due to recent volatility in the market, unit costs are anticipated to change over the next few years.
4. Based on the current replacement profile, there is an annual funding deficit of approximately $500,000. This does not include any cyclical or condition-based maintenance needs. Prior to establishing Level of Service goals, metrics, and current performance, it is recommended to investigate the availability of additional maintenance and/or replacement funding sources to facilitate realistic goal setting.
5. Update the SOIR card at a frequency consistent with updates to the inspection data driving the results. At a minimum, consider updates every 2 years following the biennial routine inspections performed on the Major asset class.
6. Creating a tailored maintenance and/or replacement strategy for the structures within the city.
7. Collect and arrange data to clarify the unit cost of maintenance activities.
8. Using data applications and other technologies to seamlessly exchange information amongst Fort Collins and others with ease. Currently, most, if not all, of the data collected regarding bridge inspections is on a master spreadsheet, which can be difficult to collaborate on.

APPENDIX A – CONDITION RATING DEFINITIONS

Table A1. Definitions of Reinforced Concrete Deck Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Cracking ≤ 0.5 mm, light scaling ≤ ¼ in., minor surface spalls, visible wear in wheel paths possible. Up to 10% water saturation with minor staining.
Fair	5-6	Up to 5% deck area spalled with possible exposed reinforcing steel. Cracking over 1.5 mm thick, moderate to heavy scaling up to 1 in. deep, up to 40% deck area stained or deteriorated. Deck edges or outlets possibly disintegrated.
Poor	0-4	More than 5% deck area is spalled with exposed reinforcing steel. At least 40% deck area is stained or deteriorated. Deck may be in critical condition that warrants structural analysis and/or closure of structure.

Table A2. Definitions of Timber/Wooden Deck Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Wood may have minor cracking or splitting. Planks possibly loose in some locations. Minor areas of rot or crushing.
Fair	5-6	Numerous rotten or crushed planks, possibly requiring replacement. Numerous planks cracked or split, many planks loose.
Poor	0-4	Majority of planks are rotten, crushed, or splitting; deck requires replacement. Severe signs of structural distress warranting structural analysis and/or closure of structure.

Table A3. Definitions of Reinf. or P/S Concrete Superstructure Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Hairline cracking ≤ 0.5 mm (flexure or isolated shear cracks). Minor collision damage not requiring corrective action. Minor surface spalls possible.
Fair	5-6	Substantial water saturation or cracking of girder ends. Up to 40% of total girder ends deteriorated. Up to 2.0 mm flexure or shear cracks present in non-critical areas. Bearing devices out of alignment or frozen requiring replacement.
Poor	0-4	Severe deterioration of concrete. Flexure or shear cracks open in critical areas. More than 40% of total girder ends deteriorated. Primary structural elements may have advanced deterioration warranting structural analysis or closure of structure.

Table A4. Definitions of Steel/Iron/Aluminum Superstructure Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Up to light rusting and possibly minor paint peeling. Up to 2% minor section loss in secondary members possible. Minor cracking in secondary members. Minor collision damage not requiring corrective action.
Fair	5-6	Moderate paint peeling with up to 10% section loss in secondary members or less than 5% section loss in primary members. Fatigue or out-of-plane cracks may be visible in non-critical areas of primary members. Some secondary members may have failed. Bearing devices or rockers out of alignment or frozen requiring replacement.
Poor	0-4	Severe section loss in critical stress areas. Fatigue or out-of-plane bending cracks in critical areas. Hinges frozen from corrosion. Advanced deterioration of primary structural elements warranting structural analysis or closure of structure.

Table A5. Definitions of Timber/Wooden Superstructure Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Minor cracking or splitting of beams or stringers at non-critical locations. Minor water saturation.
Fair	5-6	Substantial decay, cracking, splitting, or crushing of beams. Possible replacement of isolated members required due to deterioration.
Poor	0-4	Severe decay, cracking, splitting, or crushing of beams with visible settlement of deck. Critical damage sustained to members from collision, fire, etc., requiring temporary shoring. Advanced deterioration of primary structural elements warranting structural analysis or closure of structure.

Table A6. Definitions of Reinforced Concrete Substructure Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Minor deterioration with water saturation, cracking up to 1.5 mm, some leaching, minor spalls with no effect on bearing area. Possible loose or missing anchor bolts/nuts. Minor berm erosion requiring routine maintenance.
Fair	5-6	Moderate spalling with exposed reinforcing steel. Broken backwalls possible. Full length cracking up to 5.0 mm. Substructure may be out of alignment requiring remediation. Riprap failed requiring replacement. Major scour resulting in exposure of bottom of footings or piles.
Poor	0-4	Extensive spalling, cracking, leaching with exposed reinforcing steel. Structural cracks in masonry or concrete units requiring complete replacement or extensive patching. Severe scour or undermining of footings affecting stability of structure. Advanced deterioration of primary structural elements warranting structural analysis or closure of structure.

Table A7. Definitions of Timber/Wood Substructure Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Minor decay, cracking, splitting, or crushing of timber elements. Loose or missing anchor bolts and/or nuts. Minor berm erosion requiring minor maintenance.
Fair	5-6	Decay, cracking, splitting, or crushing requiring replacement of up to 25% of timber members. Deadman anchors required to stabilize bowing or shifting of backwall. Riprap failed requiring replacement. Major scour resulting in exposure of bottom of footings or piles.
Poor	0-4	Major decay, cracking, splitting, or crushing requiring replacement of up to 50% of timber members. Severe bow of abutment backwalls requiring abutments to be replaced. Severe scour or undermining of footings affecting stability of structure. Advanced deterioration of primary structural elements warranting structural analysis or closure of structure.

Table A8. Definitions of Reinforced Concrete Culvert Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Minor cracking, up to 0.5 mm, or scaling of concrete. Minor joint leakage between barrel sections or wings. Minor settlement or misalignment up to 1 in. Up to 10% ceiling deterioration.
Fair	5-6	Moderate to heavy cracking, scaling, or deterioration with exposed reinforcing steel. Ceiling deterioration up to 40%. Horizontal barrel cracks up to 4.0 mm full length with no visible bow in walls. Possible wing failure with separation from box. Heavy leakage through joints causing undermining of culvert or roadway section. Considerable settlement or misalignment up to 6 in.
Poor	0-4	Heavy cracking, scaling, spalling, or deterioration of concrete exposing large areas of reinforcing steel. Ceiling deterioration over 40%. Holes possible in walls, slab, or floor. Severe horizontal barrel cracks over 4.0 mm with visible bow in walls. Severe scour or erosion at curtain walls or wings. Integrity of culvert possibly threatened, and structure should be closed until repairs, rehabilitation, or replacement is complete.

Table A9. Definitions of Steel/Iron/Aluminum Culvert Condition Ratings

Asset Condition	Condition Rating	Description
Good	7-9	Top half of structure has smooth symmetrical curvature but minor flattening at bottom. Minor corrosion or pitting present.
Fair	5-6	Significant distortion at isolated locations in top half and extensive flattening of invert. Extensive corrosion or deep pitting. Deflection of pipe caused by backfill infiltration.
Poor	0-4	Significant distortion throughout length of pipe, lower third may be kinked, crown may be flattened. Extensive corrosion or deep pitting with scattered perforations. Integrity of culvert possibly threatened, and structure should be closed until repairs, rehabilitation, or replacement is complete.

APPENDIX B – STRUCTURE INVENTORY TABLE

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
FCBDWK-0.2-LNDS	Boardwalk Drive	Larimer Co. Canal No. 2	Concrete Culvert	Major	1,327	G	N	N	N	7
FCBRYN-0.0-WSTV	Bryan Avenue	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Major	898	F	6	6	6	7
FCBRYN-02-MULBA	Bryan Avenue	Larimer Co Canal No. 2	Concrete Culvert	Major	2,034	G	N	N	N	8
FCBTCK-TMB	Battlecreek Drive	Local Drainage	Concrete Culvert	Major	2,302	G	N	N	N	7
FCCHAS-0.1-ANSA	Chase Drive	Fossil Ck Resv Inlet	Concrete Culvert	Major	2,278	G	N	N	N	8
FCCORB-0.1-SDCK	Corbett Drive	McClellands Channel	Concrete Frame	Major	1,537	F	6	6	6	8
FCCRST-0.1-BRYN	Crestmore Court	Larimer Co. Canal No. 2	Concrete Slab	Major	624	F	7	7	6	7
FCCTRE-0.1-BAY	Centre Ave	Spring Creek	Concrete Frame	Major	3,481	G	7	7	7	8
FCCTRE-0.1-WTGN	Centre Street	New Mercer Canal	Concrete Culvert	Major	1,653	G	N	N	N	7
FCDRK-0.0-CONST	Drake Road	Spring Creek	P/S Concrete Box Beam - Multiple	Major	7,866	F	6	6	7	8
FCDRK-0.1-MDWLK	Drake Road	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Major	2,713	F	5	5	5	7
FCELIZ-0.1-BRYN	Elizabeth Street	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Major	1,536	F	5	5	5	6
FCEVINE-0.3-LMY	East Vine Drive	Dry Creek	Concrete Culvert	Major	3,737	G	N	N	N	7
FCFOSCK-0.1-HTH	Fossil Creek Pkwy.	Fossil Creek	P/S Concrete Box Beam - Single or Spread	Major	3,851	F	6	7	7	7
FCGLR-S-PLM	Glenmoor Drive	Local Drainage	Concrete Culvert	Major	2,077	G	N	N	N	7
FCHRMY-0.7-I25E	EB Harmony Road	Fossil Crk Res. Inlet	P/S Concrete Box Beam - Single or Spread	Major	3,063	G	8	8	8	7
FCHRMYW-0.7-I25	WB Harmony Road	Fossil Crk. Res. Inlet	Concrete Culvert	Major	3,268	F	N	N	N	8
FCHTHR-0.1-STUT	Heatheridge Rd.	Larimer Co. Canal No. 2	Concrete Culvert	Major	1,010	F	N	N	N	6
FCHTH-W0.1-CL	Horsetooth Road	Larimer Co Canal No. 2	P/S Concrete Box Beam - Multiple	Major	3,991	G	8	8	8	8
FCHTRD-0.2-STUT	Heatheridge Street	Importation Channel	Concrete Culvert	Major	2,673	F	N	N	N	8
FCJEROME-EVINE	Jerome Street	Lake Canal	Concrete Frame	Major	2,467	G	7	7	7	8
FCJFK-0.1-BOCK	JFK Parkway	Larimer Co Canal No. 2	Concrete Frame	Major	2,140	F	6	6	6	7
FCKETCHER-LDYMN	Kechter Road	McClellands Channel	Concrete Culvert	Major	5,360	F	N	N	N	6
FCKIN-0.2-TFHL	Kinnison Drive	Pleasant Valley Canal	Concrete Culvert	Major	1,042	G	N	N	N	8
FCLAPT-0.0FREYA	LaPorte Avenue	Larimer Co. Canal No. 2	Concrete Frame	Major	1,442	G	8	8	8	8
FCLAPT-0.0-WHTM	Whitcomb/LaPorte	Arthur Ditch	Concrete Culvert	Major	4,428	G	N	N	N	8
FCLAPT-0.1-TFTH	LaPorte Avenue	New Mercer Canal	Concrete Slab	Major	927	F	5	5	5	6
FCLDYMN-0.1-KHR	Lady Moon Drive	McClellands Channel	Concrete Culvert	Major	2,738	G	N	N	N	7
FCLAPT-PENN	LaPorte Avenue	Mercer Ditch	P/S Concrete Tee Beam	Major	1,195	F	7	6	6	8
FCLINC-0.0-WLLA	Lincoln Avenue	Cache La Poudre River	P/S Conc. Cont. Box Beam - Multiple	Major	12,788	G	7	7	7	8

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
FCLIND-0.1-WLLW	Linden Street	Cache La Poudre River	P/S Conc. Cont. Stringer/Girder	Major	10,680	F	6	7	6	7
FCLMY-0.1-RVSDE	LeMay Avenue	Cache La Poudre River	P/S Conc. Cont. Stringer/Girder	Major	17,568	F	7	7	5	6
FCLMY-0.1-STUT	LeMay Avenue	Spring Creek	Concrete Cont. Slab	Major	7,257	G	7	7	7	8
FCLMY-0.2-SRGB	South LeMay Avenue	Fossil Creek	P/S Concrete Tee Beam	Major	3,260	F	7	7	6	7
FCLMY-0.2-TRILB	South LeMay Avenue	Fossil Creek Tributary	Concrete Culvert	Major	5,722	F	N	N	N	7
FCLMY-1.2-VINE	LeMay Avenue	Larimer and Weld Canal	P/S Concrete Tee Beam	Major	1,792	F	5	5	6	7
FCLNDS-0.1-BDWK	Landing Drive	Larimer Co. Canal No. 2	Concrete Culvert	Major	1,462	F	N	N	N	7
FCMAXG-0.1-HRMY	HCL+PGL BRT Guide	Mail Creek	P/S Conc. Cont. Stringer/Girder	Major	4,362	G	7	7	8	8
FCMAXG-S0.1-JSD	BRT Guideway	Spring Creek		Major	1,137					
FCMAXG-TRT				Major	1,101					
FCMCCLE-0.1-FTH	Mc Clelland Drive	Larimer County Canal #2	Concrete Culvert	Major	1,137	G	N	N	N	8
FCMOSS-0.1-BENT	Moss Creek Drive	Moss Creek	Concrete Culvert	Major	1,101	G	N	N	N	7
FCMRSN-0.0-RYMT	Morsman Drive	New Mercer Canal	P/S Concrete Tee Beam	Major	1,493	F	6	5	5	6
FCMTCL-0.1-HTH	Mitchell Drive	Larimer Co. Canal No. 2	Concrete Frame	Major	1,416	F	5	5	6	7
FCMTV-1.2-SUMV	Mountain Vista Dr	Brewery Drainage Pond	Concrete Culvert	Major	3,240	F	N	N	N	8
FCMULB-0.0-BRYN	Mulberry Street	Larimer Co. Canal No. 2	Concrete Slab	Major	1,233	F	7	7	5	7
FCMULB-CRESTMRA	Mulberry Street	Mercer Ditch	Concrete Frame	Major	1,619	G	8	7	8	8
FCOAK-0.1-BRYN	Oak Street	Larimer Co. Canal No. 2	P/S Concrete Slab	Major	1,170	G	7	7	7	8
FCOMR-0.1-SDCK	Old Mill Road	McClellands Channel	Concrete Frame	Major	1,288	F	7	7	6	8
FCPALM-0.1-HOG	Palmer Dr	Spillway	Concrete Culvert	Major	2,482	F	N	N	N	8
FCPLM-W0.1-CTYP	Plum Street	Larimer Co. Canal No. 2	Concrete Culvert	Major	812	F	N	N	N	8
FCPROS-0.5-I25A	Prospect Avenue	Box Elder Creek	Concrete Frame	Major	4,090	G	7	7	7	8
FCPRST-0.0LYNWA	Prospect Road	Larimer Co. Canal No. 2	Concrete Culvert	Major	3,024	F	N	N	N	7
FCPRST-0.1BRTWA	Prospect Road	New Mercer Canal	Concrete Culvert	Major	2,151	G	N	N	N	8
FCPRST-0.1-SHPT	Prospect Road	Cache La Poudre River	P/S Conc. Cont. Stringer/Girder	Major	14,558	F	6	7	6	7
FCPRST-0.2-TMBL	Prospect Road	Spring Creek	Concrete Cont. Slab	Major	9,305	F	6	6	7	8
FCPRST-0.7-SHPT	Prospect Road	Cache La Poudre Overflow	P/S Concrete Slab	Major	8,839	G	8	7	8	8
FCRDWG-0.0FLKRA	Redwing Road	Larimer Co. Canal No. 2	Concrete Slab	Major	1,509	F	7	7	6	7
FCREDWD-CAJETAN	Redwood Street	Lake Canal	Concrete Frame	Major	6,603	G	7	7	7	7
FCREM-0.1-SPDR	Remington Street	Spring Creek	Concrete Slab	Major	2,272	G	7	7	7	8
FCRHF-0.0-CR84	Rawhide Flats Road	Rawhide Creek	P/S Conc. Cont. Box Beam - Single or Spread	Major	5,074	G	7	7	7	8

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
FCRHF-0.8-CR84	Rawhide Flats Road	Wire Draw	P/S Concrete Box Beam - Single or Spread	Major	1,465	G	7	7	7	8
FCRHF-3.4-CR84	Rawhide Flats Road	Wire Draw Trib.	Concrete Culvert	Major	844	G	N	N	N	7
FCRVSD-0.2PRST	Riverside Drive	Spring Creek	P/S Concrete Box Beam - Multiple	Major	3,585	G	8	8	8	8
FCSHLD-0.1-HLPD	Shields Street	Spring Creek	Concrete Culvert	Major	4,654	F	N	N	N	7
FCSHLD-0.1-RLMR	S. Shields St	Larimer Co Canal No 2	P/S Concrete Slab	Major	4,511	G	7	7	8	8
FCSHLD-0.2-STUT	Shields Street	Importation Channel	Concrete Frame	Major	4,210	F	6	6	6	8
FCSHWD-0.0-MULB	Sherwood/Mulberry	Arthur Ditch	Concrete Culvert	Major	4,513	G	N	N	N	7
FCSKY-0.0-SPINK	Skysail Lane	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Major	802	F	6	5	6	6
FCSTOV-0.1STUTA	Stover Street	Spring Creek	P/S Concrete Box Beam - Multiple	Major	3,486	F	7	6	7	8
FCSTRS-0.4-HRMY	Strauss Cabin Road	Fossil Creek Res. Inlet	Concrete Frame	Major	2,270	G	7	7	7	7
FCSTUT-0.1WHDBA	Stuart Street	Spring Creek	P/S Concrete Slab	Major	3,922	F	6	6	7	8
FCSUMVW-0.5-VIN	Timberline Road	Larimer and Weld Canal	Concrete Culvert	Major	4,295	F	N	N	N	8
FCSWLW-0.1-RGNK	West Swallow Rd	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Major	1,327	F	7	6	6	7
FCTAFT-0.0-LAPT	S. Taft Hill Road	Mercer Ditch	P/S Concrete Box Beam - Single or Spread	Major	2,452	G	7	8	8	8
FCTMB-0.1-MULB	Timberline Road	Cache La Poudre River	P/S Conc. Cont. Box Beam - Multiple	Major	19,909	G	7	7	7	8
FCTMB-0.1-PRST	Timberline Road	Spring Creek	Concrete Cont. Slab	Major	10,047	F	6	6	8	7
FCTMB-0.2-CRPTR	Timberline Road	Fossil Creek	Concrete Culvert	Major	6,008	G	N	N	N	6
FCTRT-0.0-JFK	Troutman Parkway	Larimer Co. Canal No. 2	Concrete Culvert	Major	2,638	G	N	N	N	7
FCVINE-W.5-SUMV	East Vine Drive	Lake Canal	Concrete Frame	Major	879	P	4	4	5	7
FCWHTM-0.0-MGNL	Whitcomb Street	Arthur Ditch	Concrete Culvert	Major	2,191	G	N	N	N	7
FCWLCH-0.2STUTA	Welch Street	Spring Creek	Concrete Frame	Major	1,759	G	7	7	7	7
FCWNP-0.1-ANSA	Rigden Pkwy	Fossil Ck Resv Inlet	Concrete Culvert	Major	1,529	G	N	N	N	7
FCWNP-0.1-ZIG	William Neal Pkwy	Fossil Ck Resv Inlet	Concrete Culvert	Major	1,687	G	N	N	N	7
FCWOOD-SYCM	Wood Street	Arthur Ditch	Concrete Slab	Major	2,863					
FCWTG-0.1-VINE	Waterglen Drive	Local Drainage	Concrete Frame	Major	3,783	F	6	6	7	7
FCZIEG-SAGECKRD	Ziegler Drive	McClellands Channel	Concrete Frame	Major	2,373	F	6	6	6	8
FCZIG-0.1-WNP	Ziegler Road	Fossil Ck Resv Inlet	Concrete Culvert	Major	2,370	G	N	N	N	8
LR36-0.1-7	Kechter Road	Fossil Creek Res. Inlet	P/S Concrete Tee Beam	Major	1,038	G	7	7	7	7
ANDRPK-PLEASVL	Andrews Peak Drive	Pleasant Valley Lake Canal	Concrete Culvert	Minor	570	G	N	N	N	7
BELLVIEW-WEST	Belleview Drive	Pleasant Valley Canal	Concrete Culvert	Minor	388	G	N	N	N	7
BORD-PYRE	Boardeaux Drive	Pleasant Valley & Lake	Concrete Culvert	Minor	398	G	N	N	N	8

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
BRIARWD-CLRVW	Briarwood Road	Pleasant Valley Canal	Concrete Culvert	Minor	710	G	N	N	N	7
BROOKDR-PARKWDR	Brookwood Drive	Arthur Ditch	Concrete Culvert	Minor	258	G	N	N	N	7
BRT NEW MERCER	BRT	New Mercer Ditch	Concrete Culvert	Minor	80	G	N	N	N	7
BTCK-KNLD	Battlecreek Drive	Local Drainage	Concrete Culvert	Minor	4,066	G	N	N	N	7
CANY-MULB-F-1	Parking Lot	Arthur Ditch	Concrete Slab	Minor	2,443	G	N	N	N	9
CANY-S-MULB-1	Canyon Avenue	Arthur Ditch	Concrete Slab	Minor	850	G	N	N	N	9
CEMT-MTN	Cemetery Road	New Mercer Ditch	Concrete Slab	Minor	484	F	6	6	5	N
CEMT-PRKS	Cemetery Road	New Mercer Ditch	Concrete Slab	Minor	334	F	7	6	7	N
CHRY-GRNT-1	Cherry Street	Arthur Ditch	Concrete Slab	Minor	721	G	9	9	9	N
CHRY-SYCM-A	Alley	Arthur Ditch	Concrete Slab	Minor	872	P	3	3	6	N
CIPP-DART	Cippewa Court	Arthur Ditch	Concrete Culvert	Minor	463	G	N	N	N	7
CLRC-SWTW	Clear Creek Lane	McClellands Channel	Concrete Culvert	Minor	1,918	G	N	N	N	7
CMLT-SWLW	Camelot Drive	Fossil Creek	Concrete Culvert	Minor	721	G	N	N	N	7
CORB-CFR	Corbett Drive	Sage Creek	Concrete Culvert	Minor	1,615	G	N	N	N	7
CR38-W-HLW	County Road 38	Bike / Trail	Concrete Culvert	Minor	1,022	G	N	N	N	7
CR5-PROSPECTRD	County Road 5/Main	C L Poudre Res Inlet	Concrete Cont. Slab	Minor	538	F	6	6	6	N
CRST-COOK	Crestmore Place	Mercer Ditch	Concrete Frame	Minor	614	F	6	6	6	N
CTRE-BAY	Drake Road	Mercer Ditch	Concrete Culvert	Minor	710	F	N	N	N	6
CTRE-RSRCH	Centre Ave	Local Drainage	Concrete Culvert	Minor	1,412	G	N	N	N	7
CTRE-S-RLN	Centre Ave	Arthur Ditch	Concrete Culvert	Minor	700	G	N	N	N	7
CTRE-S-RLN-F	Centre Ave	Arthur Ditch	Concrete Culvert	Minor	700	G	N	N	N	7
DNBR-S-BRMG	Dunbar Avenue	Pleasant Valley Canal	Concrete Culvert	Minor	861	G	N	N	N	7
DRAKE-WYANDOT	Drake Road	Pleasant Valley Canal	Concrete Culvert	Minor	1,432	G	N	N	N	7
DRK-MDL	Drake Road	Mercer Ditch	Concrete Culvert	Minor	958	F	N	N	N	6
ELIZ-KMBL	Elizabeth Street	Pleasant Valley Canal	Concrete Culvert	Minor	850	F	N	N	N	6
ELIZ-W-SKIN	Elizabeth Street	New Mercer Ditch	P/S Concrete Tee Beam	Minor	1,648	F	7	6	6	N
ELM-W-SHLD	Elm Street	Arthur Ditch	P/S Concrete Tee Beam	Minor	969	F	6	6	7	N
ENV-W-DRK	Environmental Drive	Foothills Regional	Concrete Culvert	Minor	452	G	N	N	N	7
FNIN-FFIV	Front Nine Drive	Mail Creek	Aluminum Culvert	Minor	420	F	N	N	N	5
FOSL-PLSH	Fossil Creek Drive	Fossil Creek	Concrete Culvert	Minor	520	G	N	N	N	7
FSIX-0.1-FFIV	Fairway 6 Drive	Mail Creek Ditch	Concrete Culvert	Minor	2,250	G	N	N	N	7
GDC-OVLD	Golden Currant Blvd	Pleasant Valley Canal	Concrete Culvert	Minor	657	G	N	N	N	7
GRNT-S-MAP	Grant Avenue	Arthur Ditch	Concrete Slab	Minor	1,055	P	3	3	6	N
HICS-SAWG	High Castle Drive	Mail Creek Ditch	Concrete Culvert	Minor	581	G	N	N	N	7
HISC-CSRG	High Castle Drive	Local Drainage	Concrete Culvert	Minor	590	G	N	N	N	7
HLCR-CLRV	Hillcrest Drive	Local Drainage	Concrete Culvert	Minor	624	G	N	N	N	7

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
HLDL-STROG	Hilldale Drive	Local Drainage	Concrete Culvert	Minor	576	G	N	N	N	7
HRMY-S-SVRG	Harmony Rd	Bike Trail	Concrete Culvert	Minor	1,249	G	N	N	N	7
HRMY-W-CLGE	Harmony Rd	Larimel #2	Concrete Culvert	Minor	1,066	F	N	N	N	5
HRMY-W-RGNC	Harmony Rd	Pleasant Valley Canal	Concrete Culvert	Minor	646	G	N	N	N	7
HTH-MCL	Horsetooth Road	Mercer Ditch	Concrete Culvert	Minor	1,227	F	N	N	N	6
HTH-PLT	Spring Canyon Park	Ped/Bike Trail	Steel Culvert	Minor	667	G	N	N	N	8
HTHRGRD-STUART	Heatheridge Rd.	Mercer Ditch	Concrete Culvert	Minor	549	G	N	N	N	7
HTH-SNCA	Horsetooth Road	Pleasant Valley Canal	Concrete Culvert	Minor	1,528	G	N	N	N	7
LAKE-W-CNTR	Lake Street	Arthur Ditch	Concrete Slab	Minor	689	P	4	4	6	N
LAKE-WLDW	Lake Street	Pleasant Valley Canal	Concrete Culvert	Minor	764	G	N	N	N	7
LAPT-GDV	LaPorte Avenue	Mercer Ditch	Concrete Frame	Minor	764	F	5	5	5	N
LMY-CON	LeMay Avenue	Lake Canal	Concrete Culvert	Minor	1,399	G	N	N	N	7
LMY-KNLD	LeMay Avenue	Mail Creek	Concrete Culvert	Minor	958	F	N	N	N	5
LMY-S-FOSL	LeMay Avenue	Ped/Bike Trail	Concrete Culvert	Minor	1,442	G	N	N	N	7
LMY-S-VINE	LeMay Avenue	Lake Canal	Concrete Cont. Slab	Minor	577	F	6	6	7	N
LOOM-MAP	Loomis Avenue	Arthur Ditch	Concrete Slab	Minor	97	P	3	3	6	N
LOOM-MAP-A	Alley	Arthur Ditch	Concrete Slab	Minor	248	P	3	3	7	N
LRL-MLD	Laurel Street	Arthur Ditch	Concrete Cont. Slab	Minor	830	F	7	7	6	N
LRL-MYRT-A	Alley	Arthur Ditch	Concrete Slab	Minor	334	P	3	3	6	N
MAP-LOOM	Maple Street	Arthur Ditch	Concrete Slab	Minor	1,012	P	3	3	6	N
MAP-W-GRNT-A	Alley	Arthur Ditch	Concrete Cont. Slab	Minor	952	F	5	5	7	N
MAP-WHTM-A	Alley	Arthur Ditch	Concrete Slab	Minor	248	P	3	3	6	N
MAXG-JSD	BRT	Sherwood Lat/Arthur Ditch	Concrete Culvert	Minor	302	G	N	N	N	8
MAXG-S-JSD-PD	BRT	Creekside Ped Path	Steel Culvert	Minor	293	G	N	N	N	8
MDWLARK-CITATON		Mercer Ditch	Concrete Culvert	Minor	1,119	G	N	N	N	7
MDWP-MLCK	Meadow Passway	Local Drainage	Steel Culvert	Minor	980	P	N	N	N	4
MGNL-OLIV-A	Alley	Arthur Ditch	Concrete Cont. Slab	Minor	258	F	6	6	6	N
MICH-OVLD-F	Michaud Ln	Pleasant Valley Canal	Steel Stringer/Girder	Minor	383	G	7	7	8	N
MLCK-ROMA	Mail Creek Lane	Local Drainage	Concrete Culvert	Minor	1,204	F	N	N	N	5
MLD-S-LRL-A	Alley	Arthur Ditch	Concrete Slab	Minor	258	P	4	4	6	N
MOORELN-DRAKE	Moore Lane	Pleasant Valley Canal	Concrete Culvert	Minor	764	G	N	N	N	7
MOUNTAN-BRYAN-N	WB Mountain Ave	Larimer Canal	Concrete Cont. Slab	Minor	624	F	6	6	5	N
MOUNTAN-BRYAN-S	EB Mountain Ave	Larimer Canal	Concrete Cont. Slab	Minor	710	F	5	5	5	N
MTHW-S-DART	Mathews Street	Arthur Ditch	P/S Concrete Tee Beam	Minor	721	F	6	6	6	N
MTN-SHWD	Mountain Ave	Arthur Ditch	Concrete Culvert	Minor	2,387	G	N	N	N	7

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
MTV-W-TMB	Mountain Vista Dr	Ditch	Aluminum Culvert	Minor	1,087	P	N	N	N	3
MYRT-MLD	Myrtle Street	Arthur Ditch	Concrete Culvert	Minor	1,862	G	8	8	8	N
OAK-MTN-A	Alley	Arthur Ditch	Concrete Cont. Slab	Minor	420	F	5	5	7	N
OAKST-WHITCOM	Oak Street	Arthur Ditch	Concrete Slab	Minor	3,627	G	7	7	9	N
OLIVE-LOOMIS	Olive & Loomis	Arthur Ditch	Concrete Culvert	Minor	3,783	G	N	N	N	7
OLIV-OAK-A	Alley	Arthur Ditch	Concrete Cont. Slab	Minor	344	F	5	5	6	N
OVERTRL-MULBERR	Overland Trail	Pleasant Valley Canal	Concrete Cont. Slab	Minor	700	G	7	7	7	N
OVLD-ELIZ	Overland Trail	Pleasant Valley Canal	Concrete Culvert	Minor	1,313	G	N	N	N	7
OVLD-S-LAKE	Overland Trail	Pleasant Valley Canal	Concrete Culvert	Minor	1,539	F	N	N	N	6
PALM-HOG	CR36/Palmer Dr	Mail Ditch	Concrete Culvert	Minor	480	G	N	N	N	7
PAV-W-CLGE	Paviliion Lane	Larimer Canal	Concrete Culvert	Minor	904	F	N	N	N	6
PORT-SW-TRIL-F	Access Road	Local Drainage	Concrete Culvert	Minor	463	G	N	N	N	7
PORT-W-TRIL-F	Exit For Transfort	Local Drainage	Concrete Culvert	Minor	322	G	N	N	N	7
PROSPT-EFRONTRD	Prospect Road	Lake Canal	Concrete Cont. Slab	Minor	517	F	6	6	5	N
PROV-LMY	Eagle Tree Access	Local Drainage	Concrete Frame	Minor	797	G	N	N	N	7
PRST-CTRE	Pedestrian Access	Pedestrian/Bike Path	Concrete Frame	Minor	1,820	G	8	8	8	N
PRST-W-CTRE	Prospect Road	Arthur Ditch	Concrete Cont. Slab	Minor	452	F	6	6	6	N
PRST-W-HRT	Prospect Road	Larimer Canal #2	Concrete Culvert	Minor	3,122	G	N	N	N	7
PRST-W-LAR	Prospect Road	Pleasant Valley Canal	Concrete Slab	Minor	1,345	G	7	7	7	N
REM-S-DART	Remington Street	Arthur Ditch	Concrete Culvert	Minor	431	G	N	N	N	7
RICH-W-TURN	Richard Lake Road	Ped/Bike Trail	Concrete Culvert	Minor	1,227	G	N	N	N	7
SENECA-HSETHT	Seneca Street	Unnamed Drainage Way	Concrete Culvert	Minor	958	F	N	N	N	6
SHLD-S-FOSL	Shields Street	Fossil Creek	Concrete Culvert	Minor	1,066	F	N	N	N	6
SHLD-S-HLDL	Shields Street	Fossil Creek Bike Trail	Concrete Culvert	Minor	893	F	N	N	N	5
SHLD-S-LDA-N	Cr 17 / Shields	Fossil Creek Tributary	Concrete Culvert	Minor	2,454	F	N	N	N	5
SHLD-S-LDA-S	Cr17 / Shields	Fossil Creek Tributary	Concrete Culvert	Minor	2,454	F	N	N	N	5
SHLD-S-RNT	Shields Street	Mercer Ditch	Concrete Culvert	Minor	1,528	G	N	N	N	7
SHWD-S-MYRT-A	Alley	Arthur Ditch	Concrete Slab	Minor	177	F	5	5	6	N
SNCA-S-TRT	Seneca Street	Local Drainage	Concrete Culvert	Minor	1,539	G	N	N	N	7
SOMERVL-CHRLSTN	Somerville Drive	Pleasant Valley Canal	Concrete Culvert	Minor	366	G	N	N	N	7
SPR-W-BRTW	Springfield Drive	New Mercer Canal	P/S Concrete Tee Beam	Minor	828	F	5	5	7	N
SPR-W-LYNN	Springfield Dr.	Larimer Co. Canal No. 2	P/S Concrete Tee Beam	Minor	828	F	5	5	6	N
STOV-DART	Stover Street	Arthur Ditch	Concrete Culvert	Minor	861	F	N	N	N	5
STOV-SWLW	Stover Street	Fossil Creek Inlet	Concrete Culvert	Minor	1,119	G	N	N	N	7
STRS-HTH	County Road 7	Box Elder Creek	Concrete Culvert	Minor	441	F	N	N	N	6
STUART-HERITAGE	Stuart Street	Larimer Canal	Concrete Cont. Slab	Minor	958	G	N	N	N	7
STUT-S-RYEL	Stuart Street	Pleasant Valley Canal	Steel Culvert	Minor	1,055	G	N	N	N	7
STUT-W-HTHR	Stuart Street	Mercer Ditch	Concrete Culvert	Minor	980	F	N	N	N	6

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
SWALWRD-MDWLARK	Swallow Road	Mercer Ditch	Concrete Culvert	Minor	1,130	G	N	N	N	7
TAFT-BRIX-PD	Taft Hill Road	Fossil Creek Bike Trail	Concrete Culvert	Minor	904	F	N	N	N	6
TAFTHILL-KINSON	Taft Hill Road	Pleasant Valley & Lake	Concrete Culvert	Minor	1,453	G	N	N	N	7
TAFTHL-DRAKE	Taft Hill Road	Spring Creek	Concrete Culvert	Minor	2,519	G	N	N	N	7
TAFTHL-DRAKE-PD	Taft Hill Road	Ped/Bike Path	Concrete Culvert	Minor	1,733	G	N	N	N	7
TAFT-S1.1-TRIL	Taft Hill Road	Local Drainage	Concrete Culvert	Minor	675	F	N	N	N	5
TFTHILL-CLRVW	Taft Hill Road	Pleasant Valley Canal	Concrete Culvert	Minor	807	G	N	N	N	7
TIMBLN-KECHTER	Timberline Road	Mail Creek Ditch	Concrete Culvert	Minor	450	G	N	N	N	7
TMB-BTCK	Timberline Road	Dixon Lateral	Concrete Culvert	Minor	1,884	F	N	N	N	5
TMB-INTR	County Road 9E	Lake Canal	Concrete Culvert	Minor	2,720	G	N	N	N	7
TMBRWD-TMBLNRD	Timberwood Drive	Dixon Lateral	Concrete Culvert	Minor	1,195	G	N	N	N	7
TMB-S-HRMY	Timberline	Local Drainage	Concrete Culvert	Minor	800	F	N	N	N	6
TMB-S-LINC	South Timberline Rd	Local Drainage	Concrete Culvert	Minor	1,300	G	N	N	N	7
TRIL-W0.3-LMY	Trilby Road	Fossil Creek	Steel Culvert	Minor	452	P	N	N	N	4
TRIL-W0.3-LMY-P	Trilby Road	Fossil Creek Trail	Concrete Frame	Minor	1,540	G	N	N	N	7
TRIL-W-PORT	Trilby Road	Local Drainage	Concrete Culvert	Minor	753	F	N	N	N	6
TRT-W-SNCA	Troutman Road	Pleasant Valley Canal	Concrete Culvert	Minor	667	F	N	N	N	6
TURN-S-RICH	Turnberry Road	Bike Path	Concrete Culvert	Minor	1,152	G	N	N	N	7
VINE-GRIF	Vine Drive	Arthur Canal	Steel Culvert	Minor	549	P	N	N	N	3
WAKE-SHLD	Wakerobin Ln	Pleasant Valley Canal	Concrete Culvert	Minor	388	F	N	N	N	6
WHTM-S-LAPT-A	Alley	Arthur Ditch	Concrete Slab	Minor	248	P	4	4	7	N
WTWL-BTCK	White Willow Drive	Local Drainage	Concrete Culvert	Minor	2,546	G	N	N	N	7
TAFT-0.4-BRIX	TAFT-0.4-BRIX	Undetermined		< 4 Feet						
KTR-I25	KTR-I25	Undetermined		< 4 Feet						
TMB-GRG	TMB-GRG	Undetermined		< 4 Feet						
ALTV-S-VINE	ALTV-S-VINE	Undetermined		< 4 Feet						
LIND-S-BUCK	LIND-S-BUCK	Undetermined		< 4 Feet						
LINC-W-3RD	LINC-W-3RD	Undetermined		< 4 Feet						
RLGW-PRKW	RLGW-PRKW	Undetermined		< 4 Feet						
LKSH-W-SVRC	LKSH-W-SVRC	Undetermined		< 4 Feet						
VIRG-S-WEL	VIRG-S-WEL	Undetermined		< 4 Feet						
DEER-CLRV	DEER-CLRV	Undetermined		< 4 Feet						
OVLD-S-DRK	OVLD-S-DRK	Undetermined		< 4 Feet						
DRK-W-PASQ	DRK-W-PASQ	Undetermined		< 4 Feet						
HRMY-W-TMB	HRMY-W-TMB	Undetermined		< 4 Feet						
CORB-HRMY	CORB-HRMY	Undetermined		< 4 Feet						

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
GIFF-HRMY	GIFF-HRMY	Undetermined		< 4 Feet						
HRMY-STRS	HRMY-STRS	Undetermined		< 4 Feet						
MOF-0.3-TAFT	MOF-0.3-TAFT	Undetermined		< 4 Feet						
ANT-SVRT	ANT-SVRT	Undetermined		< 4 Feet						
HTH-ANT	HTH-ANT	Undetermined		< 4 Feet						
ANT-S-HTH	ANT-S-HTH	Undetermined		< 4 Feet						
DEV-W-TAFT	DEV-W-TAFT	Undetermined		< 4 Feet						
BRO-W-TAFT	BRO-W-TAFT	Undetermined		< 4 Feet						
PAR-S-LKSH	PAR-S-LKSH	Undetermined		< 4 Feet						
DRI-STC	DRI-STC	Undetermined		< 4 Feet						
HRMY-W-CORB	HRMY-W-CORB	Undetermined		< 4 Feet						
STAR-S-HRMY	STAR-S-HRMY	Undetermined		< 4 Feet						
KUN-HTH	KUN-HTH	Undetermined		< 4 Feet						
TAFT-S1.2-TRIL	TAFT-S1.2-TRIL	Undetermined		< 4 Feet						
SND-WHLR	SND-WHLR	Undetermined		< 4 Feet						
WHLR-SEAW	WHLR-SEAW	Undetermined		< 4 Feet						
TCND-SHRM	TCND-SHRM	Undetermined		< 4 Feet						
TMB-SMST	TMB-SMST	Undetermined		< 4 Feet						
STRS-MARI	STRS-MARI	Undetermined		< 4 Feet						
WLMG-S-BTCK	WLMG-S-BTCK	Undetermined		< 4 Feet						
HPLW-CHIP	HPLW-CHIP	Undetermined		< 4 Feet						
HPLW-0.5-CHIP	HPLW-0.5-CHIP	Undetermined		< 4 Feet						
BRKW-LDY	BRKW-LDY	Undetermined		< 4 Feet						
ZIEG-S-ROOK	ZIEG-S-ROOK	Undetermined		< 4 Feet						
TAFT-BRIX	TAFT-BRIX	Undetermined		< 4 Feet						
TAFT-S1.0-TRIL	TAFT-S1.0-TRIL	Undetermined		< 4 Feet						
STRS-HRMY	STRS-HRMY	Undetermined		< 4 Feet						
COLB-S-SKWY	COLB-S-SKWY	Undetermined		< 4 Feet						
SNOW-HRMY-1	SNOW-HRMY-1	Undetermined		< 4 Feet						
SNOW-HRMY-2	SNOW-HRMY-2	Undetermined		< 4 Feet						
LMY-TRIL	LMY-TRIL	Undetermined		< 4 Feet						
WILX-S-BAYB	WILX-S-BAYB	Undetermined		< 4 Feet						
HCR-0.5-CLGE	HCR-0.5-CLGE	Undetermined		< 4 Feet						
HEM-0.5-MASN	HEM-0.5-MASN	Undetermined		< 4 Feet						
LNDC-LIND-S	LNDC-LIND-S	Undetermined		< 4 Feet						
BRW-VINE	BRW-VINE	Undetermined		< 4 Feet						
PND-S-PLM	PND-S-PLM	Undetermined		< 4 Feet						
GLR-W-TAFT	GLR-W-TAFT	Undetermined		< 4 Feet						
STHM-S0.03-ANTG	STHM-S0.03-ANTG	Undetermined		< 4 Feet						

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
STHM-S-ANTG	STHM-S-ANTG	Undetermined		< 4 Feet						
STHM-ANTG	STHM-ANTG	Undetermined		< 4 Feet						
STE-W-GOLD	STE-W-GOLD	Undetermined		< 4 Feet						
STE-S-GRE	STE-S-GRE	Undetermined		< 4 Feet						
BELL-W-WSTB	BELL-W-WSTB	Undetermined		< 4 Feet						
CLA-HINS	CLA-HINS	Undetermined		< 4 Feet						
LMY-S-KNLD	LMY-S-KNLD	Undetermined		< 4 Feet						
WHTN-S-KNLD	WHTN-S-KNLD	Undetermined		< 4 Feet						
TIL-OWE	TIL-OWE	Undetermined		< 4 Feet						
REG-OWE	REG-OWE	Undetermined		< 4 Feet						
TMB-FOSL	TMB-FOSL	Undetermined		< 4 Feet						
ARA-SAT	ARA-SAT	Undetermined		< 4 Feet						
MARS-W-VEN	MARS-W-VEN	Undetermined		< 4 Feet						
SKWY-MARS	SKWY-MARS	Undetermined		< 4 Feet						
CRES-CLGE	CRES-CLGE	Undetermined		< 4 Feet						
SHLD-0.2-SCE	SHLD-0.2-SCE	Undetermined		< 4 Feet						
SHLD-0.1-SCE	SHLD-0.1-SCE	Undetermined		< 4 Feet						
TAFT-S0.2-SPM	TAFT-S0.2-SPM	Undetermined		< 4 Feet						
SHLD-0.2-BON	SHLD-0.2-BON	Undetermined		< 4 Feet						
TRIL-0.2-CLGE	TRIL-0.2-CLGE	Undetermined		< 4 Feet						
TRI-S-STR	TRI-S-STR	Undetermined		< 4 Feet						
SNOW-HRMY	SNOW-HRMY	Undetermined		< 4 Feet						
TBM-BRC	TBM-BRC	Undetermined		< 4 Feet						
TAFT-S0.5-TRIL	TAFT-S0.5-TRIL	Undetermined		< 4 Feet						
TAFT-0.8-BRIX	TAFT-0.8-BRIX	Undetermined		< 4 Feet						
LDY-0.2-HRMY	LDY-0.2-HRMY	Undetermined		< 4 Feet						
SAT-W-VEN	SAT-W-VEN	Undetermined		< 4 Feet						
PC-1001				Pedestrian						
PC-1004				Pedestrian						
PE-1000	Pelican Marsh Trail	Robert Benson Lake Outlet	Steel Truss - Thru	Pedestrian	298	G	9	9	9	N
PE-1001				Pedestrian						
PE-1002				Pedestrian						
PE-1003				Pedestrian						
PE-1004				Pedestrian						
PE-1005	Spring Creek Trail Mason Trail			Pedestrian	157					
PE-1006				Pedestrian						
PE-1008				Pedestrian						

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
PE-1009				Pedestrian	718					
PE-1010				Pedestrian	295					
PE-1011				Pedestrian	990					
PE-1012				Pedestrian	558					
PE-1013		Cache la Poudre River		Pedestrian						
PE-1014		Cache la Poudre River		Pedestrian						
PE-1015				Pedestrian						
PE-1016				Pedestrian						
PN-1000	Pelican Marsh Natural Area			Pedestrian						
PN-1001				Pedestrian	805					
PN-1002				Pedestrian						
PN-1003				Pedestrian						
PN-1004				Pedestrian						
PN-1005				Pedestrian						
PN-1006				Pedestrian	1,111					
PN-1007				Pedestrian	804					
PN-1008				Pedestrian						
PN-1009				Pedestrian						
PN-1010				Pedestrian						
PN-1011				Pedestrian						
PN-1012				Pedestrian						
PN-1013				Pedestrian						
PN-1014				Pedestrian	827					
PN-1015				Pedestrian						
PN-1016				Pedestrian						
PN-1017				Pedestrian						
PP-1000	Colina Mariposa Area Trail	Trib. Fossil Creek	Concrete Slab	Pedestrian	336	G	9	9	9	N
PP-1001	Fossil Creek Wetlands Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	390	G	9	9	8	N
PP-1002	Fossil Creek Trail Access	Tribly Lateral	Concrete Culvert	Pedestrian	70	G	N	N	N	9
PP-1003	Fossil Creek Trail Access	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	662	F	6	8	8	N
PP-1004	Hazaleus Natural Area	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	805	G	8	9	9	N
PP-1005	Fossil Creek Trail	Fossil Creek	Steel Truss - Thru	Pedestrian	804	G	8	8	9	N
PP-1006	Fossil Creek Trail	Fossil Creek	Steel Truss - Thru	Pedestrian	639	G	9	9	9	N
PP-1007	Fossil Creek Trail	Fossil Creek	Steel Truss - Thru	Pedestrian	827	G	8	9	9	N

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
PP-1008	Fossil Creek Trail Access	Portner Reservoir Overflow	Timber Stringer/Girder	Pedestrian	185	G	9	8	8	N
PP-1009	Fossil Creek Trail Access	Fossil Creek	Steel Truss - Thru	Pedestrian	1,111	G	8	9	7	N
PP-1010	Fossil Creek Trail Access	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	866	F	6	8	8	N
PP-1011	Power Trail	Mail Creek Ditch	Steel Truss - Thru	Pedestrian	654	G	8	9	7	N
PP-1012	Harmony Park Trail	Trib. Muskrat Ditch	Steel Truss - Thru	Pedestrian	157	F	6	6	8	N
PP-1013	Harmony Park Trail	Trib. Muskrat Ditch	Aluminum/Iron Truss - Thru	Pedestrian	78	F	9	9	5	N
PP-1014	Harmony Park Trail	Trib. Muskrat Ditch	Timber Stringer/Girder	Pedestrian	192	F	7	6	8	N
PP-1015	Twin Solo Park Trail	Muskrat Ditch	Steel Truss - Thru	Pedestrian	137	G	9	9	9	N
PP-1016	Twin Solo Park Trail	Muskrat Ditch	Steel Truss - Thru	Pedestrian	706	G	9	9	8	N
PP-1017	Twin Solo Park Trail	Muskrat Ditch	Steel Truss - Thru	Pedestrian	731	G	9	8	8	N
PP-1018	Radiant Park Trail	Muskrat Ditch	Steel Truss - Thru	Pedestrian	850	F	6	9	8	N
PP-1019	Radiant Park Trail	Muskrat Ditch	Steel Truss - Thru	Pedestrian	443	F	6	9	8	N
PP-1020	Fossil Creek Trail			Pedestrian	654					
PP-1021	Fossil Creek Trail			Pedestrian						
PP-1022	Spring Canyon			Pedestrian						
PP-1023	Spring Canyon Park			Pedestrian						
PP-1024	Spring Creek Trail			Pedestrian						
PP-1025	Spring Creek Trail			Pedestrian						
PP-1026	Spring Creek Trail			Pedestrian						
PP-1027	Spring Creek Trail			Pedestrian						
PP-1028	Spring Creek Trail			Pedestrian	192					
PP-1029	Spring Creek Trail			Pedestrian						
PP-1030	Spring Creek Trail			Pedestrian						
PP-1031	Spring Creek Trail			Pedestrian						
PP-1032	Pleasant Valley Trail			Pedestrian						
PP-1033	Pleasant Valley Trail			Pedestrian						
PP-1034	Troutman			Pedestrian						
PP-1035				Pedestrian	866					
PP-1036				Pedestrian						
PP-1037	Landings			Pedestrian						
PP-1038	English Ranch			Pedestrian						

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
PP-1039	Rendezvous Trail			Pedestrian						
PP-1040	Rendezvous Trail			Pedestrian						
PP-1041				Pedestrian	639					
PP-1042				Pedestrian	78					
PP-1043				Pedestrian						
PP-1044	Poudre Trail - Arapahoe Bend Nature Area			Pedestrian						
PP-1045	Overland			Pedestrian						
PP-1046	Overland			Pedestrian						
PP-1047	Spring Creek Trail - Rolland Moore Park	Cache la Poudre River		Pedestrian						
PP-1048	Spring Creek Trail - Rolland Moore Park	Boxelder Ditch		Pedestrian						
PP-1049	Rolland Moore			Pedestrian						
PP-1050	Rolland Moore	Jackson Ditch		Pedestrian						
PP-1051	Rolland Moore			Pedestrian						
PP-1052	Rolland Moore			Pedestrian						
PP-1053	Rolland Moore			Pedestrian						
PP-1054	Rolland Moore			Pedestrian						
PP-1055	Rolland Moore			Pedestrian						
PP-1056	Rolland Moore			Pedestrian						
PP-1057	Spring Creek Trail - Rolland Moore Park			Pedestrian						
PP-1058	Rolland Moore			Pedestrian						
PP-1059	Spring Creek Trail - Rolland Moore Park			Pedestrian						
PP-1060	Spring Creek Trail	Cache la Poudre River		Pedestrian						
PP-1061	Spring Creek Trail			Pedestrian						
PP-1062	Spring Creek Trail			Pedestrian						
PP-1063	Spring Creek Trail - Lilac Park			Pedestrian	443					
PP-1064	Fossil Creek Trail			Pedestrian						
PP-1065	Creekside			Pedestrian						
PP-1066	Avery			Pedestrian						
PP-1067	City Park			Pedestrian						

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
PP-1068	City Park			Pedestrian						
PP-1069	Spring Creek Trail - Spring Park			Pedestrian						
PP-1070	Spring Creek Trail - Mallard's Nest Nature Area			Pedestrian						
PP-1071	Spring Creek Trail - Mallard's Nest Nature Area			Pedestrian						
PP-1072	Spring Creek Trail			Pedestrian						
PP-1073	Poudre Trail - Springer Natural Area			Pedestrian	662					
PP-1074				Pedestrian	731					
PP-1075	Spring Creek Trail - Eldora Park			Pedestrian						
PP-1076	Eldora			Pedestrian						
PP-1077	Spring Creek Trail			Pedestrian						
PP-1078	Spring Creek Trail			Pedestrian						
PP-1079	Poudre Trail - Prospect Ponds Natural Area			Pedestrian						
PP-1080	Other Facilities			Pedestrian						
PP-1081	City Park			Pedestrian						
PP-1082	Poudre Trail			Pedestrian	336					
PP-1083	Poudre Trail - Hickory Trail, Salyer N.A./Legacy Park			Pedestrian	185					
PP-1084	Poudre Trail - Homestead Natural Area			Pedestrian						
PP-1085	Poudre Trail - Butterfly Wood Natural Area			Pedestrian						
PP-1086	Poudre Trail - Cattail Chorus Natural Area			Pedestrian						
PP-1087	Fossil Creek Wetlands Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	657	G	9	8	8	N

Bridge ID	Facility Carried	Feature Intersected	Structure Type	Asset Category	Deck Area (SF)	FHWA Cond.	Deck	Super	Sub	Clv
PP-1088	Fossil Creek Wetlands Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	305	G	8	8	8	N
PP-1089	Fossil Creek Wetlands Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	718	G	8	8	8	N
PP-1090	Fossil Creek Wetlands Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	295	G	8	9	7	N
PP-1091	Power Trail	Fossil Creek	Steel Truss - Thru	Pedestrian	990	G	8	9	9	N
PP-1092	Mason Trail	Trib. Fossil Creek	Steel Truss - Thru	Pedestrian	558	F	7	6	7	N
PP-1093	Poudre Trail	Cache la Poudre River		Pedestrian						
PP-1094	Fossil Creek Trail			Pedestrian	298					
PP-1095	Fossil Creek Trail	Tribly Lateral	Steel Truss - Thru	Pedestrian	200	F	6	8	8	N
PP-1096	Whitewater			Pedestrian	305					
PP-1097	City Nine Golf Course			Pedestrian	200					
PP-1098	City Nine Golf Course	Cache la Poudre River		Pedestrian						
PP-1099	City Nine Golf Course			Pedestrian						
PP-1100	City Nine Golf Course			Pedestrian						
PP-1101	City Nine Golf Course			Pedestrian						
PP-1102	City Nine Golf Course			Pedestrian						
PP-1103	City Nine Golf Course			Pedestrian						
PP-1104	City Nine Golf Course			Pedestrian						
SKIM-OVLD				Unprogrammed						

APPENDIX C – EXAMPLE TREATMENT STRATEGY

The below strategies are aligned with the condition rating (good, fair, and poor), which is based upon the lowest component rating as defined by the FHWA. Fort Collins also uses Structural Rating as a supplemental method of defining the "health" of the infrastructure. Both condition ratings are used to identify which infrastructure in the city requires prioritization.

Table 1. General Bridge Maintenance Guide

Condition Rating	Description	Maintenance Strategy	Maintenance Activities			
			Deck	Superstructure	Substructure	Culvert
9	Excellent	PCL	Deck sweeping/ washing (1-2 years) Drain/joint cleanout (1-2 years) Crack and/or deck sealing (5-10 years)	Waterproofing membrane (5-10 years)	Waterproofing membrane (5-10 years) Abutment debris/trash cleanout (1-2 years)	Debris, trash removal (2-4 years) Channel cleanout (2-4 years)
8	Very Good					
7	Good					
6	Satisfactory	PCB	Repair, replace deck drains (25 years) Joint seal replacement (15 years) Joint replacement/ elimination (25 years) Mill and overlay (30 years)	Structural steel painting (10-20 years) Steel member repair (25 years) Patch/repair concrete (10-15 years) Bearing repair/replacement (35 years)	Patch/repair concrete (10-20 years) Structural steel painting (10-20 years) FRP wrap (50 years)	Scour countermeasures (10-20 years)
5	Fair					
4	Poor	RR	Redeck (45-75 years)	Full structure replacement (50-125 years)		
3	Serious					
2	Critical					
1	Imminent Failure					
0	Failed/ Closed					

Maintenance Activity (Recommended Interval)
PCL = Preservation / Cyclic Maintenance
PCB = Preservation / Condition-Based Maintenance
RR = Rehabilitation / Replacement

Maintenance Strategy for Bridge Service Area

The maintenance strategy for the Bridge Service Area is dependent upon the conditioning of the structures in question. The strategy changes depending on the score, and there are three strategies for three groups of conditions. For structures with a Condition Rating of 7-9, the maintenance strategy is PCL – Preservation/Cyclic Maintenance. For structures with a Condition Rating of 5-6, the maintenance strategy is PCB – Preservation/Condition-Based Maintenance. For structures with a Condition Rating of 0-4, the maintenance strategy is RR – Rehabilitation/Replacement. Maintenance activities for each structure thereafter is dependent upon which element of the structure is under maintenance.

PCL Maintenance Strategy for Structures Rated 7-9

Structures rated 7, 8, and 9 are classified as Good, Very Good, and Excellent Condition, respectively. Maintenance Strategy for this group of structures falls under PCL – Preservation/Cyclic Maintenance. Deck maintenance activities include: deck sweeping/washing at 1-2 years, drain/joint cleanout at 1-2 years, and crack and/or deck sealing at 5-10 years. Superstructure maintenance activities include waterproofing membrane at 5-10 years. Substructure maintenance activities include: waterproofing membrane at 5-10 years and abutment debris/trash cleanout at 1-2 years. Culvert maintenance activities include: debris, trash removal at 2-4 years and channel cleanout at 2-4 years.

PCB Maintenance Strategy for Structures Rated 5-6

Structures rated 5 and 6 are classified as Fair and Satisfactory Condition, respectively. Maintenance Strategy for this group of structures falls under PCB – Preservation/Condition-Based Maintenance. Deck maintenance activities include: repair, replace deck drains at 25 years, joint seal replacement at 15 years, joint replacement/elimination at 25 years, and mill and overlay at 30 years. Superstructure maintenance activities include: structural steel painting at 10-20 years, steel member repair at 25 years, patch/repair concrete at 10-15 years, and bearing repair/replacement at 35 years. Substructure maintenance activities include: patch/repair concrete at 10-20 years, structural steel painting at 10-20 years, and FRP wrap at 50 years. Culvert maintenance activities include scour countermeasures at 10-20 years.

RR Maintenance Strategy for Structures Rated 0-4

Structures rated 0, 1, 2, 3 and 4 are classified as Failed/Closed, Imminent Failure, Critical, Serious, and Poor Condition, respectively. Maintenance Strategy for this group of structures falls under RR – Rehabilitation/Replacement. Deck maintenance activities include: redeck at 45-75 years. Superstructure, substructure, and culvert maintenance activities all include full structure replacement at 50-125 years.

Expansion Strategy

Identify expansion needs based on traffic counts. Identify growth and capacity related capital projects from the comprehensive plan, infrastructure master plan, and land use plan. Undertake environmental assessments.

Disposal Activities

Structure disposal is infrequent and generally related to reconstruction. If a roadway section that is carried by a structure is abandoned, the structure may be deconstructed, sold, or repurposed.

Treatment Unit Cost and Application Rate

To determine the replacement cost of assets, Fort Collins uses the following three methods: local price indices, published price indices, and accounting estimates. Using the same three methods is expected to define the unit cost of each treatment for assets. Data has not yet been collected regarding the various treatment costs of items to maintain the existing infrastructure; however, estimates are shown below based on information for other nearby locations in the Midwest.

Treatment Strategy	Maintenance Item	Unit	Base Unit Cost	Unit Cost ($/SF)	Construction Cost ($)	Project Cost Factor	Project Cost ($)
PCL -Good	Deck Sweeping/Washing		90,243	165	14,890,020	2.25	33,502,544
	Drain/Joint Cleanout		146,563	180	26,381,392	2.0	52,762,784
	Crack and/or Deck Sealing		76,359	175	13,362,825	2.0	26,725,650
	Waterproofing Membrane for Superstructure		893	200	178,600	2.0	357,200
	Waterproofing Membrane for Substructure						
	Abutment Debris/trash cleanout for Substructure						
	Debris, Trash Removal for Culvert						
	Channel Cleanout						
	Unknown	2	2,238	450,000*	900,000	2.25	2,025,000
	Subtotal	*93*	*316,296*		*55,712,837*		*115,373,178*
PCB – Fair	Concrete Culvert	84	95,867	165	15,818,055	2.5	39,545,138
	Steel/Aluminum Culvert	8	5,503	150	825,450	2.5	2,063,625
	Reinforced Concrete	36	28,457	175	4,979,975	2.25	11,204,944
	Prestressed Concrete	5	4,994	180	898,920	2.25	2,022,570
	Steel	1	383	200	76,600	2.25	172,350
	Subtotal	*134*	*135,204*		*22,599,000*		*55,008,626*
RR -Poor	Steel/Aluminum/ Iron Truss	24	13,881	195	2,706,795	1.5	4,060,193
	Reinforced Concrete	1	336	170	57,120	1.5	85,680
	Concrete Culvert/Frame	1	70	160	11,200	1.75	19,600
	Timber	2	377	150	56,550	1.5	84,825
	Unknown	113	11,854	275,000*	31,075,000	1.5	46,612,500
	Subtotal	*141*	*26,518*		*33,906,665*		*50,862,798*
Less than 4-Feet	Unknown	80	-	125,000*	10,000,000	1.5	15,000,000
	Subtotal	*80*	-		*10,000,000*		*15,000,000*
Unprogrammed	Unknown	1	-	450,000*	450,000	2.0	900,000
	Subtotal	*1*	-		*450,000*		*900,000*
Total		**446**	**478,018**		**$122,668,502**		**$237,144,602**

** Lump sum estimate used for structures with unknown deck area*

APPENDIX D – EXAMPLE USEFUL LIFE

Asset life expectancy depends on a number of factors, including construction practices (poor vs. good workmanship), maintenance practices (proactive vs. reactive), treatment timing, and asset usage. When attention is not given to these factors, a bridge asset may deteriorate at an accelerated rate and its life expectancy may be much shorter. It is important for asset owners to establish and implement a comprehensive condition assessment program and treatment strategy to maximize the service life of a structure.

Utilizing historical condition ratings and structure performance results for bridge networks throughout the Midwest region, Benesch developed useful life estimates for FC's bridge assets based on asset category, asset component, and material as shown in Table 2. The ranges listed within each category represent the variability in asset performance due to numerous external variables that can affect a bridge component. These useful lives, and associated deterioration profiles, have been tailored for the Colorado region and their results have been corroborated by doctoral candidate research from the University of Missouri.

Table D1. Useful Life by Asset Type

Asset Category	Asset Component	Useful Life (Years)				
		Reinforced Concrete	Prestressed Concrete	Steel/Iron	Aluminum	Timber
Major	Deck	45-65	-	-	-	-
	Superstructure	60-80	60-90	75-125	-	-
	Substructure	65-125	-	-	-	-
	Culvert	60-125	-	-	-	-
Minor	Deck	45-65	-	-	-	
	Superstructure	60-80	60-90	75-105	-	-
	Substructure	65-125	-	-	-	-
	Culvert	60-125	-	45-85	35-75	-
Pedestrian	Deck	65-95	-	-	-	35-60
	Superstructure	45-75	-	50-75	45-65	35-60
	Substructure	50-100	-	-	-	45-75
	Culvert	65-100		-	-	-
Less than 4-feet	Culvert	50-125	-	-	-	-
Unprogrammed	Culvert	50-125	-	-	-	-

Note that estimated service lives in Table 1 are shown only for structures that contain current material/design type data in the city's inventory. The lower value of each listed lifespan can be interpreted as the anticipated service life with no maintenance or repairs performed; a "natural" service life. External variables, such as high traffic volumes, extreme weather events, and material defects, can further decrease this estimate.

It must be noted, however, that the design life of a bridge is preferred instead of the useful life of a bridge when Fort Collins conducts prioritization of projects due to a lack of data. There is also a degree of variability in whether the structures meet the design life for proper lifecycle analysis. So, a design life of 75 years is

applied for structures built after the year 2000, and 50 years for structures built before the year 2000, which is noted below in Appendix B.