APRIL 2017

# Design Study Report

PEDESTRIAN BRIDGE INSPECTION
MOA PROJECT B

Samantha Caldwell
Shelley Giraldo, P.M.
Jared Kinney
Brian Weigand
SEAWOLF ENGINEERING

# EXECUTIVE SUMMARY

## Overview

The Municipality of Anchorage Parks and Recreation Department contracted with Seawolf Engineering to develop a pedestrian bridge inspection program, create a GIS geodatabase to house collected pedestrian bridge inspection data, conduct inspections of pedestrian bridges along the Chester Creek Trail and perform a full structural analysis of one pedestrian bridge. A student team at the University of Alaska Anchorage completed this project as part of their Civil Engineering senior capstone course.

The objectives of the Pedestrian Bridge Inspection Project (MOA Project B) were to:

- Create an inspection template that can be used by Anchorage Parks and Recreation employees to conduct routine inspections of pedestrian bridges and culverts throughout Anchorage;
- Conduct inspections of fifteen (15) pedestrian bridges crossing Chester Creek using the inspection template;
- Create a geodatabase to store the information collected during pedestrian bridge inspections;
- Conduct a structural analysis of one bridge to determine whether it up to code and whether it requires bollards or signage to prevent vehicle crossings;
- Increase safety by creating a methodology to ensure that structural deficiencies are discovered and repaired in a timely manner.

Challenges associated with this project were:

- Inspections occurred during the winter, so bridge members, especially decks and expansion joints, were not fully visible due to snow and ice cover;
- As-builts and design documents for inspected bridges were not readily available from the Municipality of Anchorage;
- Load ratings do not exist for all inspected bridges.

The inspection template provides Anchorage Parks and Recreation employees with an easy-to-use method of evaluating pedestrian bridges in Anchorage. The geodatabase will serve as both an archive and an up-to-date registry of Anchorage's pedestrian bridges and their conditions. The formulated inspection template and geodatabase are valuable tools that can be utilized to assist Parks and Recreation in making thoughtful decisions that prioritize safety on Anchorage's trails, determine where capital improvements should be directed, and identify which pedestrian bridges merit rehabilitation.

## Evaluation Process

Project development for the Pedestrian Bridge Inspection Program was an iterative process performed based on input from Josh Durand, Parks Superintendent and client representing the Municipality of Anchorage (MOA). Selection of the template form was based on the client's preferences, usability, and a desire to stay current with technology. In order to create the inspection program, the American Association of State Highway and Transportation Officials (AASHTO) *Guide Specifications for the Design of Pedestrian Bridges*, the AASHTO *LRFD Bridge Design Specifications,* the FHWA *Bridge Inspector's Reference Manual*, and the FHWA *Recording and Coding Guide for the Structural Inventory and Appraisal of the Nation's Bridges* were heavily referenced. The selected template platform was tested in the field. The final product was analyzed based on user-friendliness, compatibility with ESRI software, and long term maintenance costs.

## Recommended Alternatives

Based on the evaluation criteria, a customized Survey 123 Application, the MOA Project B Application (App), was identified as the preferred alternative for conducting pedestrian bridge inspections. The MOA Project B App was generally preferred because:

- It is user-friendly;
- It can be installed on any iOS or Android device;
- Its GPS function is typically accurate to within 50 feet, which is sufficient for locating bridges;
- Results can be uploaded to the geodatabase instantly from any device with an internet connection;
- The results can be exported as a shapefile and imported to the ESRI Bridge Inventory;
- Anchorage Parks and Recreation plans to implement the ESRI Bridge Inventory tool for bridge management, and using an ESRI product ensures compatibility with the Bridge Inventory;

An Environmental Standards Research Institute (ESRI) cloud-based geodatabase was identified as the preferred geodatabase alternative. An ESRI cloud-based geodatabase was generally preferred because:

- It can be accessed from any device with ArcGIS and an internet connection;
- ESRI sets GIS standards;
- An ESRI geodatabase will not cost MOA any additional money for setup or maintenance.

# TABLE OF CONTENTS

# LIST OF FIGURES



# LIST OF TABLES



## LIST OF ACRONYMS

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AISC | American Institute of Steel Construction |
| BIA IRR | Bureau of Indian Affairs Indian Reservation Roads Program |
| ESRI | Environmental Standards Research Institute |
| GIS | Geographic Information System |
| IBC | International Building Code |
| ICC | International Construction Council |
| MOA | Municipality of Anchorage |
| NDS | National Design Standards |
| SDSFIE | Spatial Data Standards for Facilities, Infrastructure, and Environment |

# 1.0 INTRODUCTION

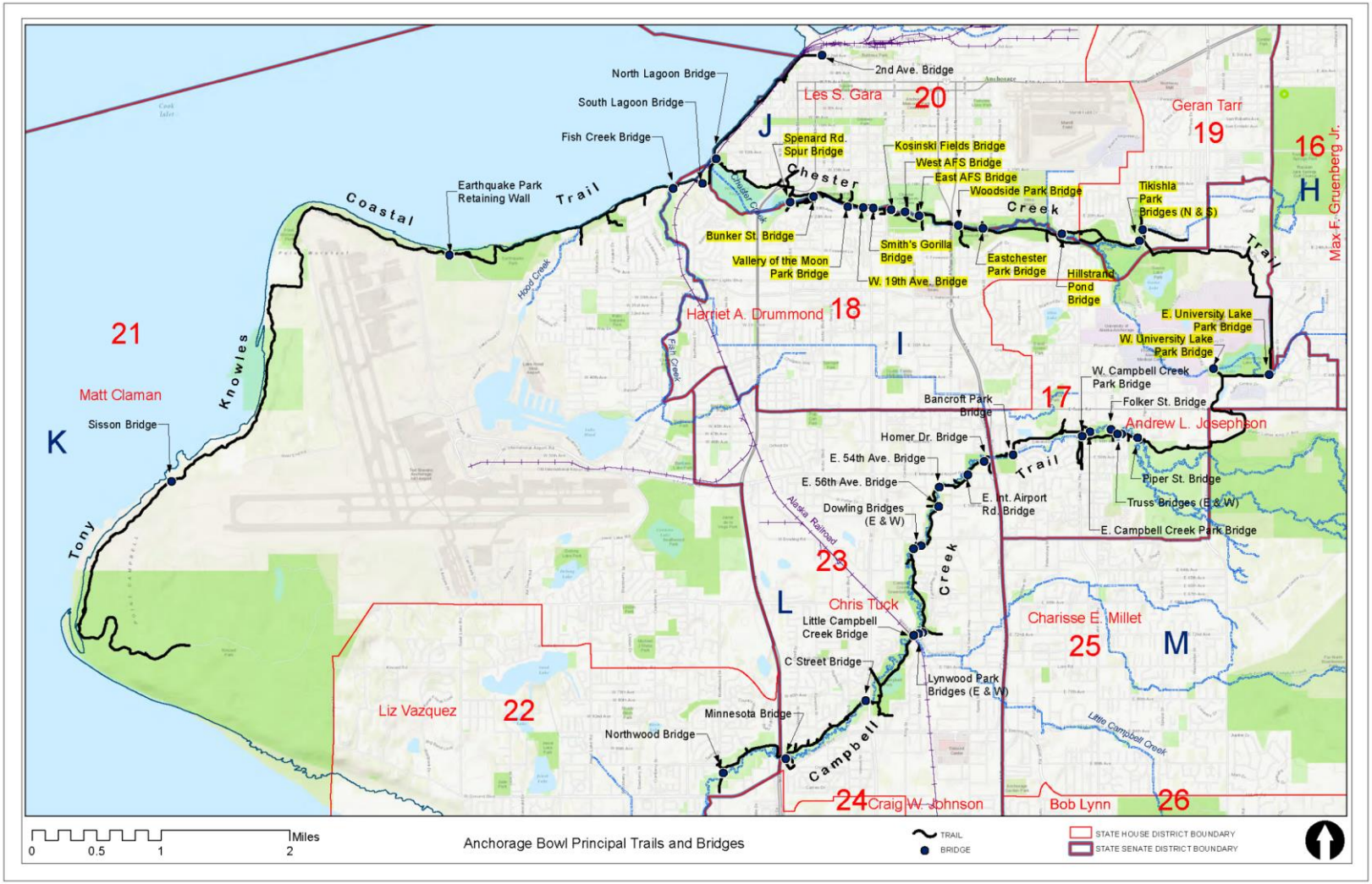
## 1.1 General

Seawolf Engineering contracted with the Municipality of Anchorage Parks and Recreation Department to provide alternatives for the creation of a Pedestrian Bridge Inspection Program for the municipality, evaluate pedestrian bridges along the Chester Creek Trail, and model a full structural analysis for one bridge. The creation of a Pedestrian Bridge Inspection Program supports Anchorage Parks and Recreation's mission to keep Anchorage's trails well-maintained and contributes to the health and safety of the Anchorage community.

The Municipality of Anchorage supports over 120 miles of paved multi-use trails. These trails cross many creeks, streams, and lagoons, requiring numerous pedestrian bridges. In 2014, one of these pedestrian bridges, North Westchester Lagoon Bridge, failed when utility truck drove across it. The bridge failure alerted the MOA to the possibility that other bridges on Anchorage trail systems may also be decaying and near failure. Since the MOA did not have a bridge inspection template, protocol, or program in place, they contacted Seawolf Engineers for assistance in creating a program. Figure 1 depicts the locations of the pedestrian bridges in the Municipality of Anchorage and highlights the fifteen (15) bridges inspected as part of this project.

This project and the development of a Pedestrian Bridge Inspection program provides Parks and Recreation employees with a simple method of evaluating pedestrian bridges in Anchorage. The creation of the geodatabase enables Parks and Recreation to keep an up-to-date registry of the condition of Anchorage's pedestrian bridges. The project has populated the geodatabase with information about the fifteen (15) bridges inspected along Chester Creek Trail. Additionally, the Tikishla Park Bridge North was structurally analyzed to provide an example of how each bridge could be evaluated to determine whether the bridge can support required design load ratings. Knowing whether or not bridges are up to code informs decisions to post signage, place bollards, or retrofit or replace bridges.

*Figure 1. Pedestrian Bridges in Anchorage*



## 1.2 Project History

The approximately 70-foot North Westchester Lagoon Bridge was built in 1987 to connect downtown Anchorage to Westchester Lagoon. The bridge was made from two glulam girders spanned by a wooden deck which was supported by wooden ledgers. On June 16, 2014, the bridge failed when a 7,099 lb. truck towing a 7,300 lb. wood chipper attempted to cross. USKH, Inc. conducted a failure investigation which determined that failure occurred due to cross-grain tension in the glulam beam. The failure stemmed from water draining off the deck and permeating the timber via lag bolts drilled into the glulam beam. The moisture caused decay leading to failure.

In 2013 the deck had been covered with a fiberglass overlay and the railings had been improved. However, no other retrofits or modifications had occurred since construction. Since MOA did not have a Pedestrian Bridge Inspection Program, the bridge had not undergone regular inspections to ensure that the design load ratings were still applicable. In 2015, the bridge was replaced by Bristol Prime Contractors.

*Figure 2. Westchester Lagoon Bridge Failure*

# 2.0 BACKGROUND & EXISTING CONDITIONS

## 2.1 Purpose and Need

The purpose of this project was to:

- Create an inspection template that can be used by Anchorage Parks and Recreation employees to conduct routine inspections of pedestrian bridges and culverts throughout Anchorage;
- Conduct inspections of fifteen (15) bridges crossing Chester Creek using the inspection template;
- Create a geodatabase to store the information collected during pedestrian bridge inspections and populate the geodatabase with information about each bridge on Chester Creek, including inspection results, photos, as-builts, and design drawings;
- Conduct a structural analysis of one bridge to determine whether it up to code and whether it requires bollards or signage to prevent vehicle crossings;
- Increase safety by creating a methodology to ensure that structural deficiencies are discovered and repaired in a timely manner.

The Anchorage Parks and Recreation Department has approved the GIS application which was customized for pedestrian bridge inspection. The overall goal of this project was to create a program for bridge inspection and a geodatabase that will serve as both an archive and an up-to-date source for information about the condition of Anchorage's pedestrian bridges. The safety improvements that will occur as a result of this project will enable Anchorage Parks and Recreation to continue their mission of Healthy Parks, Healthy People.

Anchorage Parks and Recreation also has a goal of staying current with technology and is moving toward implementing the ESRI Bridge Inventory tool. The GIS application developed for this project will be able to fully integrate with the ESRI Bridge Inventory.

## 2.2 Project Goals

The Pedestrian Bridge Inspection Project was conducted in close collaboration with the client. The client has been involved during all stages of the project and has helped define the problems to be addressed and has provided input on preferred solutions to the problems. Goals identified from input from the agency stakeholder include:

- Improve pedestrian, bicyclist, and skier safety in the Anchorage community;
- Support the Anchorage Parks and Recreation mission for Healthy Parks, Healthy People;
- Protect the interests of Anchorage Parks and Recreation by providing an easy usable way to help them fulfill their mission;
- Promote the advancement of technology in solving community problems;
- Design and create a bridge inspection program that minimizes long-term liability and maintenance and operational costs;
- Demonstrate a methodology for performing structural analyses of bridges in order to determine whether or not existing bridges are up to code;
- Utilize the methodology to determine whether specific bridges require signage, bollards, rehabilitation or replacement.

The design study did not consider a "no action" alternative as viable, as this would not resolve the problems identified. The project developed with input from the client until a preferred alternative was fully developed to address the identified problems.

## 2.3 Guiding Plans

As previously mentioned, Anchorage Parks and Recreation utilizes cloud-based ESRI products, and is moving towards ESRI's ArcGIS Bridge Inventory. This commitment to improving Anchorage Parks and Recreation's technological capabilities guided the process of creating a template compatible with the Survey 123 Application and a geodatabase housed on the ESRI server.

## 2.4 Facility Description, Context, and Setting

The Lanie Fleischer Chester Creek Trail follows Chester Creek from Westchester Lagoon to Goose Lake. The scope of this project continued southeast around Goose Lake, through the University of Alaska Anchorage main campus, to University Lake. The fifteen (15) bridge inspections included both bridges at University Lake. Chester Creek trail is approximately four miles long, paved, and lighted. It passes through Margaret Eagan Sullivan Park, Valley of the Moon Park, Eastchester Park, Woodside Park, Chester Creek Greenbelt Park, Davenport Fields, and Tikishla Park. It also connects to Goose Lake Park Trail. It is a multi-use facility accommodating pedestrians, bikers, and skiers. The trail is heavily used year round as depicted in Figures 3 and 4.

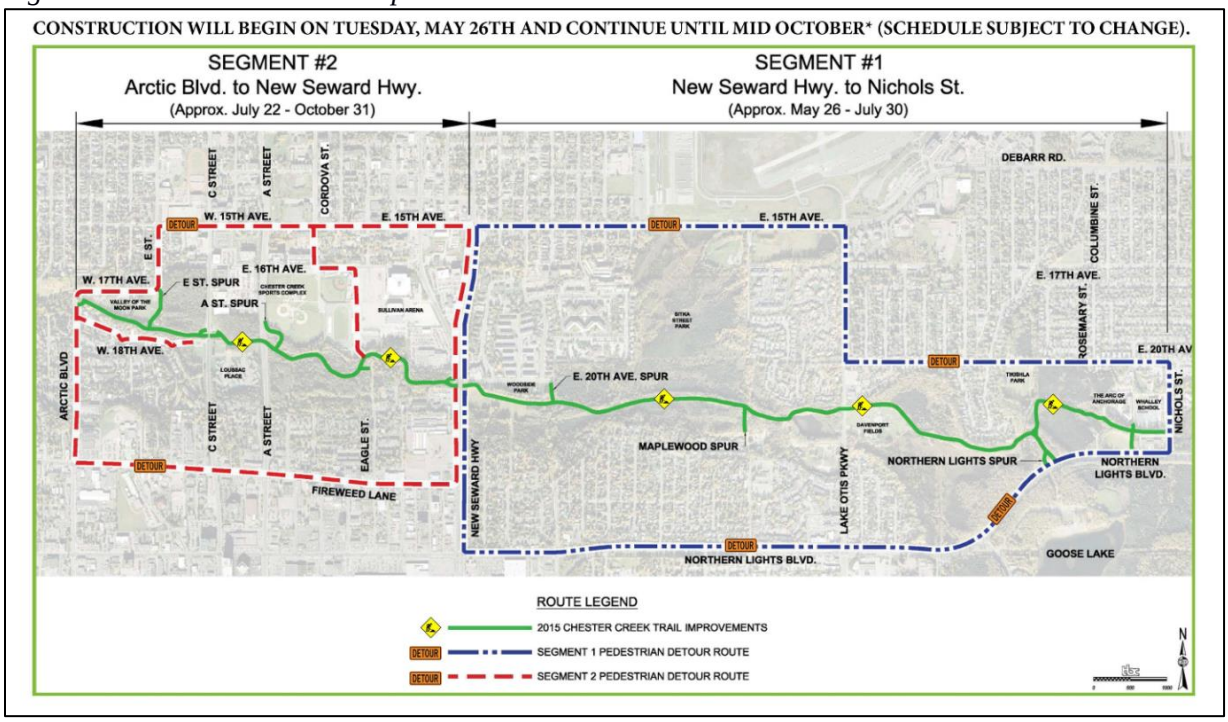
*Figure 4. Chester Creek Trail in Summer*

*Figure 3. Chester Creek Trail in Winter*


## 2.5 Trail Conditions

The Chester Creek trail is paved and is groomed in winter to facilitate cross country skiing and snow biking. During the summer of 2015, the trail was repaved and improved. Figure 2.3 depicts the notice of construction, retrieved from the Alaska Public Media website.

*Figure 5. Chester Creek Trail Improvements*



# 3.0 INSPECTION TEMPLATE

## 3.1 General

The U.S. Department of Transportation Federal Highway Administration website states: "The primary purpose of the NBIS (National Bridge Inspection Standards) is to locate and evaluate existing bridge deficiencies to ensure the safety of the traveling public." While the NBIS primarily addresses traffic bridges, it is also important to ensure the safety of the public on pedestrian bridges. The purpose of the bridge inspection template is to provide a simple form that can be used to identify and collect bridge attributes and deficiencies in the field. The information collected via the form can be used to determine if a bridge has alarming deficiencies, in which case a full inspection and structural analysis should be conducted by an engineer. The analysis can then inform decisions to add signage or bollards to the bridge, or to retrofit or replace the bridge.

To create the Pedestrian Bridge Inspection Template, design standards were referenced, and existing bridge inspection reports were studied. Specifically, bridge inspections from the Bureau of Indian Affairs (BIA) Indian Reservation Roads (IRR) Program were utilized as bridge inspection template models. Additionally, terminology and rating descriptions were adapted from the Bureau of Indian Affairs *IRR BISS2 Lookup Report*. The referenced bridge inspection reports were applicable for bridges bearing automotive traffic and therefore had to be modified for use with pedestrian bridges.

An Excel template was first formulated and tested in the field to determine which attributes and deficiency categories were relevant to pedestrian bridge inspection. After the Excel template was refined, an online version and a customized Survey 123 Application were created to contain the information presented in the Excel template.

## 3.2 Design Standards

The design guidelines and references used for this project are listed in Table 1.

*Table 1. Design Guideline References*

| Author | Name | Year |
|---|---|---|
| AASHTO | Guide for the Planning, Design, and Operation of Pedestrian Facilities | 2004 |
| AASHTO | LRFD Bridge Design Specifications | 2012 |
| AASHTO | LRFD Guide Specifications for the Design of Pedestrian Bridges | 2014 |
| BIA | Indian Reservation Roads Program BISS2 Lookup Report | - |
| BIA | Indian Reservation Roads Program Bridge Inspection Reports | - |
| ICC | International Building Code | 2012 |
| USDOT FHWA | Bridge Inspector's Reference Manual | 2012 |
| USDOT FHWA | Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges | 1995 |
| USDOT FHWA | National Bridge Inspection Standards 23 CFR 650 | 2017 |

## 3.3 Template Design Criteria

The purpose of a pedestrian bridge inspection template is to collect information needed to evaluate bridge deficiencies and perform condition ratings for each bridge element. Therefore, all bridge attributes and their corresponding conditions must be delineated. Attribute criterion includes general information such as report number, northing and easting coordinates, weather, temperature, inspection date, bridge name, physical location (trail name and park name), inspector(s) name, and feature crossed (creek, stream, lagoon, trail, et cetera). It describes the bridge approaches and signage. It also delineates the bridge's superstructure including railing, decking, truss members, expansion joints, transverse floor beams, longitudinal stringers and girders, and the bridge's substructure including abutments, foundations, piers, retaining walls and culverts. Additionally, the waterway must be evaluated to determine the waterway slope and the occurrence of any scour or erosion. Figure 6 depicts a typical pedestrian bridge in Anchorage.

*Figure 6. Typical Pedestrian Bridge*

In addition to identifying structural deficiencies, the template is designed to determine whether a bridge undergoing inspection meets the American Association of State and Highway Transportation Officials (AASHTO) Specifications for railings. For example, Section 13.9.2 of the AASHTO LRFD Bridge Design Specifications states that guardrails on bicycle paths must be a minimum of 54 inches high from the walking surface to the top of the guardrail, and Section 13.8.1 states that guardrails shall not allow the passage of a sphere 6 inches in diameter.

## 3.4 Inspection Template Alternatives

To create a pedestrian bridge inspection template, two types of inspections were delineated: routine and full. Routine inspections should occur annually and be conducted by Parks and Recreation employees in order to determine the condition of pedestrian bridges along MOA trails. Full inspections should occur when a routine inspection determines that alarming deficiencies are

present in a bridge. An engineer should perform the full inspection and structural analysis of the bridge in question to determine what remediation measures are necessary.

After delineating inspection types, four inspection template alternatives were created.

*Alternative One – Full Inspection Form*

The first developed alternative was a full inspection template generated using Excel. The Bureau of Indian Affairs (BIA) full inspection report was heavily referenced to create this template. Since the BIA report was created for traffic bridges, only elements that were considered to be relevant to pedestrian bridges were adapted. The inspection form was developed to be versatile enough that any pedestrian bridge type could be inspected utilizing the form. Since *Alternative One* represents a full inspection template, it would be ideal for use by engineers.

*Alternative Two – Routine Inspection Form*

The second alternative was an Excel template derived from *Alternative One*. The first alternative was considered too detailed and technical for routine inspections conducted by municipality employees (non-engineers). To create *Alternative Two,* many technical terms were simplified to avoid confusion, and elements that did not directly pertain to the safety and structural integrity of the bridge were excluded. *Alternative Two* was developed to be used for any pedestrian bridge type and was updated to include a nifty approach diagram, a compass, and simplified bridge categories. To aid inspectors, form fields and descriptions were defined at the bottom of each page.

*Alternative Three – VBA Custom Application*

The third developed alternative was based on a private server. On the ESRI website, an open-sourced code is offered and can be downloaded for personal and business use. The source code, which enables a user to take GPS coordinates, was brought into Visual Basic (VBA) using Excel. A web-based inspection template was then created using VBA script. The web-based inspection template was easier to use than the Excel template because the VBA script could easily transform the inspection information into a shapefile. However, it had a limited number of available fields, would lag if more than 100 fields were entered, and would not seamlessly transfer into the ESRI Bridge Inventory. Additionally, in order to be fully customizable, a monthly server subscription would have to be purchased.

*Alternative Four – MOA Project B Application*

The fourth and final alternative is based on the ESRI cloud-based server. It utilizes a customized version of the Survey 123 Application, which is free and can be downloaded for personal or business use from the ESRI website. The customized application, named the MOA Project B Application, can be used to collect inspection information which can then be stored on the ESRI server. The customization of the Survey 123 Application utilized the originally downloaded source code and VBA code developed for *Alternative Three*. An xls (Microsoft Excel file format) script was created to manage the VBA code and construct a custom interface that could be placed on the ESRI server (the cloud). The MOA Project B Application (App) references the xls script in order to create an inspection template and the custom interface allows all information entered into the App to be sent to the cloud-based geodatabase. The use of xls makes it very easy to alter the

original source code, giving the user easy access to modify the App anyway they please. To create a shapefile that is compatible with the ESRI Bridge Inventory, a python code was written to bridge the gap between the MOA Project B Application and ArcGIS.

*Preferred Alternative – MOA Project B Application*

*Alternative Four*, the MOA Project B App, was chosen as the *Preferred Alternative* since it is free, can maintain 1000 fields, does not lag when used for long periods, is user-friendly, and can be formatted to automatically update to the current SDSFIE standards. It does not require intense programming and will seamlessly transfer into the ESRI Bridge Inventory.

# 4.0 PEDESTRIAN BRIDGE INSPECTIONS

## 4.1 General

Inspections of the fifteen (15) bridges on Chester Creek Trail were conducted from February 4th 2017 to March 14th 2017. Prior to conducting inspections, the inspection template alternatives were developed. The inspections were used to field-test the four inspection template alternatives. The alternatives were modified and the fourth alternative was selected as the *Preferred Alternative* based on experiences and feedback from inspections. During inspection, the Tikishla Park Bridge North was identified as the bridge in the worst condition and was chosen for full structural analysis. Tasks for each inspection included:

- Collecting general bridge information such as location, weather and GPS coordinates;
- Measuring sight distances from each bridge approach using a laser distance finder;
- Measuring railing heights and clear space between railings;
- Visually inspecting each bridge element;
- Testing the integrity of bridge elements using hammers;
- Photographing any noted defects, deterioration or deformation;
- Quantitatively assessing the condition of each bridge element.

Since the *Preferred Alternative* was not fully developed until after bridge inspections were completed, information from the 15 inspections was manually entered into the MOA Project B Application in the office. The full inspection forms for the 15 conducted inspections can be found in Appendix B.

## 4.2 Inspection Results

During inspection, each component of each bridge was assigned a condition rating. The condition ratings were based on the general rating system presented in Table 2 and the scour rating criteria shown in Table 3. The condition rating tables were adapted from the *BIA Indian Reservation Roads Program BISS2 Lookup Report* and made applicable for pedestrian bridges. These rating tables can also be found in the *MOA Pedestrian Bridge Inspection Guide*.

The condition ratings assigned to each of the 15 inspected bridges are listed in Tables 4, 5 and 6. Most of the condition ratings ranged between 6 and 7, which indicates that in general, the bridges are in good condition. Condition ratings below 3 are cause for concern and should trigger a full inspection and structural analysis by a professional engineer.

*Table 2. Rating System*

| Rating | Condition | Description |
|---|---|---|
| 0 | Failed Condition | Out of service. Beyond Corrective Action. |
| 1 | “Imminent” Failure Condition | Major deterioration or section loss present in railing components or obvious vertical or horizontal movement affecting railing stability. Bridge is closed to pedestrian traffic but corrective action may put bridge back into service |
| 2 | Critical Condition | Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close bridge until corrective action is taken. |
| 3 | Serious Condition | Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present. |
| 4 | Poor Condition | Advanced section loss, deterioration, spalling or scour |
| 5 | Fair Condition | All primary structural elements are sound but may have minor section loss, cracking, spalling or scour. |
| 6 | Satisfactory Condition | Structural elements show some minor deterioration. |
| 7 | Good Condition | Some minor problems noted. |
| 8 | Very Good Condition | No problems noted. |
| 9 | Excellent Condition | Excellent condition. |
| N | Not Applicable | Not applicable. |

*Table 3. Scour Rating*

| Rating | Condition | Description |
|---|---|---|
| 0 | Failure Condition | Bridge is closed. Channel has failed or bridge has excessive scour. |
| 1 | "Imminent" Failure Condition | Bridge is closed. Channel has failed but corrective action may put it back in light service; Failure of piers/abutments is imminent. |
| 2 | Critical Condition | Channel has meandered to extent that bridge is near state of collapse; Extensive scour has occurred at bridge foundations, requiring immediate action. |
| 3 | Serious Condition | Sediment accumulation or erosion threaten bridge or trail; Bridge foundations are unstable due to scour. |
| 4 | Poor Condition | Bank or embankment protection are severely undermined; Foundations may be exposed due to erosion or corrosion and action should be taken. |
| 5 | Fair Condition | Bank protections are being eroded; Trees and brush restrict the channel; Bridge foundations are stable. |
| 6 | Satisfactory Condition | Bank is beginning to slump and minor stream bed movement is evident; There is minimal scour near foundations. |
| 7 | Good Condition | Bank protection is in need of minor repairs; Countermeasures may have been installed to correct previous problem. |
| 8 | Very Good Condition | Banks are protected or well vegetated; Bridge foundations are stable and any scour is above top of foundation. |
| 9 | Excellent Condition | There are no channel deficiencies; Bridge foundations are on dry land well above flood water elevations |
| N | Not Applicable | The bridge is not over a waterway. |

*Table 4. Superstructure Condition Ratings*

| Bridge | Railing | Truss | Deck/Deck Overlay | Expansion Joints | Floor Beams | Stringers/ Girders |
|---|---|---|---|---|---|---|
| Spenard Rd. Spur Bridge | 8 | 8 | 7 | 8 | 8 | - |
| Bunker St. Bridge | 6 | 6 | 5 | 6 | 7 | 6 |
| Valley of the Moon Park Bridge | 7 | - | 7 | N | - | 8 |
| W. 19th Ave. Bridge | 4 | - | 5 | N | 7 | 6 |
| Smith's Gorilla Bridge | 6 | 5 | 6 | 6 | 6 | 6 |
| Kosinski Fields Bridge | 6 | - | 6 | N | 7 | 5 |
| West AFS Bridge | 7 | 6 | 6 | N | 6 | 6 |
| East AFS Bridge | 6 | 5 | 6 | N | 6 | 6 |
| Woodside Park Bridge | 7 | 5 | 6 | N | 6 | 5 |
| Eastchester Park Bridge | 6 | 6 | 7 | 5 | 6 | 6 |
| Hillstrand Pond Bridge | 8 | - | - | - | - | - |
| Tikishla Park Bridge North | 5 | - | 6 | 6 | - | 6 |
| Tikishla Park Bridge South | 5 | - | 7 | N | - | 6 |
| West University Lake Park Bridge | 7 | 7 | 7 | N | 7 | 7 |
| East University Lake Park Bridge | 6 | 6 | 7 | N | 5 | 5 |

*Table 5. Substructure and Slope Condition Ratings*

| Bridge | Abutment | Abutment Foundation | Piers | Retaining Wall | Scour |
|---|---|---|---|---|---|
| Spenard Rd. Spur Bridge | 7 | 7 | - | - | 7 |
| Bunker St. Bridge | 7 | 7 | - | - | 7 |
| Valley of the Moon Park Bridge | N | N | N | - | N |
| W. 19th Ave. Bridge | 7 | 7 | - | - | 6 |
| Smith's Gorilla Bridge | 7 | 7 | - | - | 7 |
| Kosinski Fields Bridge | 7 | 6 | - | - | 4 |
| West AFS Bridge | 7 | 6 | - | - | 5 |
| East AFS Bridge | 7 | 6 | - | - | 6 |
| Woodside Park Bridge | 7 | 7 | - | - | 6 |
| Eastchester Park Bridge | 7 | 6 | - | - | 7 |
| Tikishla Park North Bridge | 7 | 6 | - | - | 6 |
| Tikishla Park South Bridge | 7 | 6 | - | - | 6 |
| West University Lake Park Bridge | 7 | 7 | - | - | 6 |
| East University Lake Park Bridge | 7 | 7 | - | - | 7 |

*Table 6. Culvert and Slope Condition Ratings*

| Bridge | Culvert Surface | Culvert | Parapets | Inlet Apron | Outlet Apron | Scour |
|---|---|---|---|---|---|---|
| Hillstrand Pond Bridge | 7 | 7 | N | 6 | 5 | N |

Many of the inspected bridges do not meet the guardrail requirements specified in the *AASHTO LRFD Bridge Design Specifications*. Section 13.8.1 dictates that gaps between railing members cannot allow the passage of a sphere 6 inches in diameter. Section 13.8.1 applies to both pedestrian and bicycle traffic. Section 13.8.1 also requires railings to be at least 42 inches high. However, Section 13.9.2 requires railings for bridges on bicycle paths to be at least 54 inches high. Because Anchorage's trails are multi-use, Section 13.9.2 was used to evaluate compliance with railing height requirements. Table 5 delineates compliance with AASHTO requirements. Cells highlighted in green represent compliances while cells highlighted in red represent non-compliances.

*Table 7. Railing Compliance with AASHTO Requirements*

| Bridge | Guardrail Height* (in) | Size of Largest Guardrail Gap (in) |
|---|---|---|
| Spenard Rd. Spur Bridge | 66 | small |
| Bunker St. Bridge | 42 | 9 |
| Valley of the Moon Park Bridge | 38 | small |
| W. 19th Ave. Bridge | 32 | 24 |
| Smith's Gorilla Bridge | 54 | small |
| Kosinski Fields Bridge | 55 | 9.5 |
| West AFS Bridge | 57 | 8.75 |
| East AFS Bridge | 48 | 7 |
| Woodside Park Bridge | 54 | 9 |
| Eastchester Park Bridge | 54 | 7.5 |
| Hillstrand Pond Bridge | 51 | 7 |
| Tikishla Park North Bridge | 48 | 9.5 |
| Tikishla Park South Bridge | 48 | 8 |
| West University Lake Park Bridge | 42 | 4 |
| East University Lake Park Bridge | 42 | 6 |

*Guardrails that meet the 54" height requirement are not necessarily 54" above the snow coverage on the bridge deck in winter. Further study regarding maximum snow coverage in winter is required.

# 5.0 GEODATABASE ALTERNATIVES

## 5.1 General

The geodatabase was created to store the results of pedestrian bridge inspections that will be conducted by Parks and Recreation employees. It has been populated with information from the 15 inspections conducted by Seawolf Engineering. The MOA Project B Application has over 200 fields describing each bridge's components. Each of these fields can be queried in GIS in order to find bridge deficiencies. For example, the data could be queried in order to determine how many and which bridges have railings that are not compliant with AASHTO standards.

## 5.2 Design Standards

Since a large portion of ESRI's funding comes from the Federal government, ESRI complies with federal design standards. In order to keep the geodatabase standardized, the project team chose to comply with the most commonly used federal design standard, Spatial Data Standards for Facilities Infrastructure and Environment (SDSFIE). Since the customized application is a gateway to the ESRI cloud-based geodatabase, it is automatically updated with the newest SDSFIE. Currently the Municipality of Anchorage uses Federal Geographic Data Committee (FGDC) standards which SDSFIE complies with. The SDSFIE standard determines characteristics such as line weights, colors, and shapes that are used in databases.

## 5.3 Design Criteria

The geodatabase will house an up-to-date inventory of Anchorage's pedestrian bridges. Parks and Recreation delineated three design criterion for the geodatabase. First, the geotadabase should be cloud-based and compatible with ESRI's ArcGIS Bridge Inventory. Second, the geodatabase should be accessible from devices that are not connected to MOA servers. Third, the geodatabase should be easy to use, since many users will not have GIS training. It will also allow employees to add features without updating the entire server.

## 5.4 Design Alternatives

Several geodatabase alternatives were identified.

*Alternative One – Access Geodatabase*
The first developed alternative was a Microsoft Access geodatabase. This type of geodatabase is very commonly used by local state and federal governments. It is popular because it can be used by anyone who has Microsoft products installed on their computer. However, Microsoft Access geodatabases are limited to local networks, and Parks and Recreation requested a geodatabase that could be accessed by any state or municipality user.

*Alternative Two – ArcGIS Geodatabase*
The second alternative was an ArcGIS geodatabase. *Alternative Two* is favorable because the MOA currently has ArcGIS installed on their computers, which would allow data from various MOA Project B Survey users to be easily integrated, merged and published. However, the

ArcGIS database is also limited to a local network and users would have to be trained in ESRI products in order to manipulate any of the data.

*Alternative Three – Cloud-Based ESRI Geodatabase*
The final developed alternative is a cloud-based ESRI geodatabase that can be accessed from any location and on any device (as long as the user has internet connection). This geodatabase can simultaneously be linked to multiple GIS geodatabases by giving a user version permission. It is capable of being upgraded to any server model or downgraded to meet the demand of a local server that would like to access the data. In order to make the data user friendly and easy to manipulate, the geodatabase utilizes a custom VBA script.

*Preferred Alternative – Cloud-Based ESRI Geodatabase*
*Alternative Three*, the cloud-based ESRI geodatabase, was chosen as the *Preferred Alternative* since it can be accessed from any location in the world and with any device, such as a smart phone. Additionally, the geodatabase can easily be upgraded or downgraded to a local server, is very user friendly, and can give multiple permission versions.

# 6.0 STRUCTURAL ANALYSIS

## 6.1 General

Several bridges were considered possible candidates for the analysis during the pedestrian bridge inspections. The pedestrian bridge that Seawolf Engineering chose to analyze was the Tikishla Park Bridge North.

## 6.2 Selection Criteria

After inspecting all of the pedestrian bridges along the Chester Creek Trail, Seawolf Engineering selected the Tikishla Park Bridge North for structural analysis based on the following factors:

- Available Documents
- Feasible Configuration
- Time Constraints
- Structural Deficiencies

In the beginning phase of the project, attempts were made to procure bridge design documents, construction plans and as-builts. However, MOA was unable to release their plan sets to Seawolf Engineering without an official project code, which could not be acquired. As a result, Seawolf Engineering was only given access to documents for a few bridges, and the acquired documents were mostly incomplete and illegible due to low quality scanning. While only two out of sixteen (2/16) of the plan sheets for the Tikishla Park Bridge North were available, the documentation provided sufficient information about the basic bridge configuration and assembly to allow for structural analysis. Unfortunately, there were no general notes or material specifications on the plan sheets provided.

The Tikishla Park Bridge North is a simply-supported bridge comprised of a timber frame resting on two steel girders, while many of the other bridges on the Chester Creek trail have more complicated configurations. When determining which bridge to analyze, Seawolf Engineering had to take feasibility of analysis and time constraints into account. Performing a structural analysis on a more complicated bridge structure while completing the rest of the project deliverables within the timeframe of one semester was not considered to be feasible.

The structural deficiencies of the Tikishla Park Bridge North also made it a good candidate for analysis. The timber frame exhibited wood decay and the railing was sagging. The girders exhibited scaling rust, which could lead to section loss.

## 6.3 Analysis

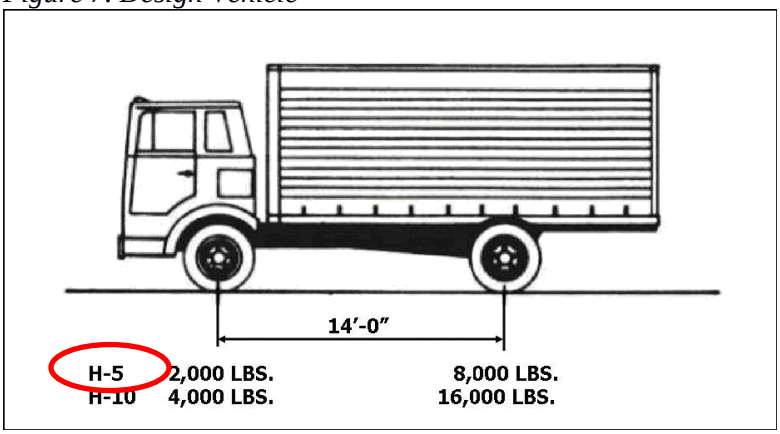
To perform a full structural analysis, the timber decking and the steel girders were analyzed separately. The allowable bending, shear and bearing stresses in the decking were determined using the 2015 *National Design Specification for Wood Construction (NDS)*, while the allowable bending, shear and deflection in the steel girders were calculated using the American Institute of Steel Construction (AISC) *Steel Construction Manual 14th Edition (SCM)*. Appropriate load combinations and design load factors were selected using recommendations from the *American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Guide Specification for the Design of Pedestrian Bridges, 2010*.

The following two load scenarios were considered in analysis:

- Scenario 1 – Pedestrian + Snow + Dead loads;
- Scenario 2 – Dead + Live loads.

Dead load is the self-weight of the bridge, while live load represents a moving vehicle load, such as a utility truck. The moving vehicle was modeled using an H-5 design vehicle, as shown in Figure 7. Note that pedestrian, snow and vehicle loads were multiplied by a load factor of 1.75 for analysis, while the dead load (self-weight of bridge) was factored by 1.25, as per AASHTO specifications.

*Figure 7. Design Vehicle*



Details about the structural analysis can be found in the "Structural Analysis Report: Tikishla Park Bridge North" located in Appendix C.

## 6.4 Analysis Results

The required design loads due to factored load combinations were compared with allowable member stresses to produce analysis results. The decking was found to be adequate for the Pedestrian + Snow + Dead loading. However, the decking would likely fail in shear if the design vehicle attempted to cross the Tikishla Park Bridge North (Dead + Live loading). The girder was found to be inadequate for Pedestrian + Snow + Dead loads. While the girders would not likely fail due to the Dead + Live (Vehicular) loads, they would exhibit more deflection than allowed per specification.

More detailed analysis results can be found in the "Structural Analysis Report: Tikishla Park Bridge North" located in Appendix C.

# 7.0 EVALUATION AND RECOMMENDATIONS

## 7.1 General

The project evaluated several alternatives for a pedestrian bridge inspection program. The preferred alternatives for inspection and a geodatabase were identified as follows:

- The MOA Project B Application was chosen for inspection of pedestrian bridges and can be installed on any iOS or Android device;
- An ESRI cloud-based geodatabase was chosen to store and visualize data collected using the MOA Project B Application.

Utilizing the customized Survey 123 Application and ESRI cloud-based geodatabase are recommended for future inspections. The Survey 123 Application and the MOA Project B Survey function best on an iPad with an attached keyboard, but will work on any iOS or Android device.

The project team evaluated 15 pedestrian bridges along the Chester Creek Trail and performed a structural analysis for the Tikishla Park Bridge North. Recommendations based on the inspections and the analysis are delineated in Sections 7.2 and 7.3, respectively.

## 7.2 Bridge Rehabilitation Recommendations

The bridges along Chester Creek Trail were largely free of structural deficiencies. The most common problems identified were corrosion of steel members and decay of wood members. The following safety and rehabilitation measure are recommended:

- – All Bridges
  - Install signage stating “Unauthorized Motor Vehicles Prohibited”;
  - Perform inspections in summer when decking and waterway are accessible;
  - Rehabilitate railings to comply with AASHTO specifications;

01 – Spenard Road Spur Bridge

- Fix abrupt edge on Approach 2 (tripping hazard);
- Replace missing “No Fishing Sign” on Approach 2;

02 – Bunker Street Bridge

- Replace decking.;
- Replace approach reflectors;

03 – Valley of the Moon Park Bridge

- Remove sight obstructions at Approach 1;
- Replace missing signage;
- Fix railing splices such that they are flush;
- Refasten bolted connections holding the electrical utility to the deck as they are tearing out;

04 – West 19th Avenue Bridge

- Replace approach reflectors;
- Replace railing and decking;
- Test extent of decay inside glulam beams;
- Examine abutment after flooding event;

05 – Smith's Gorilla Bridge

- Remove sight obstructions at Approach 1;
- Replace missing hardware at main bridge segment connection;

06 – Kosinski Fields Bridge

- Test extent of decay inside glulam beams;
- Remove sight obstructions at Approach 1;
- Monitor slope under Approach 2 abutment after flood events or high water; slope eroding away under abutment;

07 – West AFS Bridge

- Remove sight obstructions at Approach 1;
- Replace approach reflectors;
- Monitor slope under Approach 1 abutment after flood events or high water; slope eroding away under abutment;

08 – East AFS Bridge

- Remove sight obstructions at Approach two;
- Post load rating signage for bridge;
- Replace missing hardware;

09 – Woodside Park Bridge

- No specific recommendations;

10 – Eastchester Park Bridge

- Remove sight obstructions at Approach 1;

11 – Hillstrand Pond Bridge

- Replace approach reflectors;
- Inpsect scour between the culverts

12 – Tikishla Park Bridge North

- Install removable bollards;
- Replace railing;
- Remove debris found on abutment and girders;
- Fix abrupt edge on Approach 2 (tripping hazard);
- Remove sight obstructions at Approach 2;
- Replace approach reflectors.

- Fix wood frame that is separating from girders

13 – Tikishla Park Bridge South

- Install removable bollards.
- Replace railing.
- Removed debris found on abutment.
- Remove sight obstructions at Approaches 1 and 2.

14 – East University Lake Park Bridge

- Clear debris from steel members
- Remove sight obstructions at Approaches 1 and 2.

15 – West University Lake Park Bridge

- Clear debris from steel members
- Repaint members with protective paint after sandblasting corrosion.
- Remove sight obstructions at Approaches 1 and 2.

## 7.3 Structural Analysis Recommendations

Based on inspection, provided documentation, and the structural analysis, the following recommendations for the Tikishla Park Bridge North have been delineated. The original plan sheets provided by MOA indicated that the original design called for installation of bollards and signage stating “No Unauthorized Motor Vehicles.” It is recommended that bollards and signage be immediately installed at the Tikishla Park Bridge North. Since the sight distance at the south end of the North Tikishla Park Bridge is limited, removing a few trees to improve safety is recommended. Due to decay, rehabilitation of the decking and timber is recommended and rebuilding the bridge should be considered.

# APPENDICES

## Appendix A – References

American Association of Transportation and Highway Officials (AASHTO) (2004). *Guide for the Planning, Design, and Operation of Pedestrian Facilities.* Washington, DC: AASHTO.

American Association of Transportation and Highway Officials (AASHTO) (2010). *LRFD Bridge Design Specifications, 5th edition.* Washington, DC: AASHTO.

American Association of Transportation and Highway Officials (AASHTO) (2014). *LRFD Guide Specifications for the Design of Pedestrian Bridges, 2nd edition.* Washington, DC: AASHTO.

Bureau of Indian Affairs (BIA). *Indian Reservation Roads Program BISS2 Lookup Report.* Retrieved from https://itims.bia.gov/index.shtml.

Bureau of Indian Affairs (BIA). *Bridge Inspection Reports.* Retrieved from Rodney P. Kinney and Associates (RPKA).

Hillman, A. (2015). "Chester Creek Trail to Close This Summer for Repaving." Alaska Public Media. Retrieved from http://www.alaskapublic.org/2015/05/21/chester-creek-trail-will-close-for-most-of-summer-to-be-repaved/.

International Code Council (2012). *International Building Code.* Illinois: International Code Council, Inc.

New York State Department of Transportation (NYSDOT) (2017). *Bridge Inspection Manual.* Retrieved from https://www.dot.ny.gov/divisions/engineering/structures/repository/manuals/inspection/nysdot_bridge_inspection_manual_2017.pdf.

U.S. Department of Transportation (US DOT) Federal Highway Administration (FHWA). *Bridge Inspector's Reference Manual (BIRM).* Retrieved from https://www.fhwa.dot.gov/bridge/nbis/pubs/nhi12049.pdf.

U.S. Department of Transportation (US DOT) Federal Highway Administration (FHWA). *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges.* Retrieved from https://www.fhwa.dot.gov/bridge/mtguide.pdf.

U.S. Department of Transportation Federal Highway Administration Bridges & Structures. *Questions and Answers on the National Bridge Inspection Standards 23 CFR 650 Subpart C.* "General Questions and Answers:" Retrieved from https://www.fhwa.dot.gov/bridge/nbis/.

## Appendix B – Bridge Inspection Forms

[Page intentionally left blank]

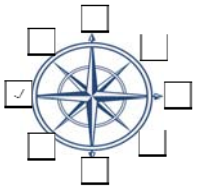
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

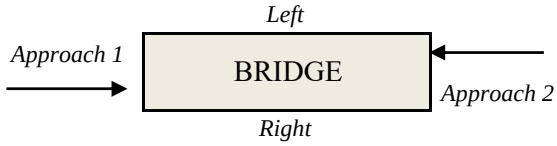
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 5 | WEATHER | Fog | TEMP | 20 | DATE | 2/25/17 |
| STRUCTURE NAME | Spenard Road Spur Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Westchester Lagoon (Waterfowl Sanctuary) | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Brian Weigand | | | | | | |
| FEATURE CROSSED | Westchester Lagoon | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | Could not be seen from provided summer photos (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Beyond 100ft trees and brush obstructed sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.25 in |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.75 in |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors |
| Other Sign | 2 | Both Approaches | Missing | No | Waters Closed to Salmon Fishing | (1) Missing, Approach 2 |
| Load Limit | 2 | Both Approaches | Good | Yes | Vehicle Load Limit 6,000 lbs | Manufacturer and Load Capcity |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | |
|---|---|
| RAILING HEIGHT | 5.5 ft |
| TOE PLATE IS PRESENT | Yes |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | Yes |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | n/a |

### Truss (Bridge Type D only)

| | |
|---|---|
| TRUSS HEIGHT | ft |
| VERTICAL CLEARANCE | ft |

### Decking

| | |
|---|---|
| DECK OVERLAY MATERIAL | None |
| DECK OVERLAY THICKNESS | in |
| DECK MATERIAL | Concrete |
| DECK THICKNESS | 4 in |
| EXPANSION JOINT GAP | 0 in |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with minor surface rust throughout railing. Minor surface rust on all railing welds. | | | C | | 8 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Unpainted members with minor surface rust throughout structure. Minor surface rust on all welded connections. | | | C | | 8 |
| C | DECK AND DECK OVERLAY | Could not assess during inspection, due to compact snow. Condition based on 2012 photos. Good Condition. Further inspection may be required. | | | | | 7 |
| S | EXPANSION JOINTS | Expansion plate in good condition. | | | | | 8 |
| S | FLOOR BEAMS (TRANSVERSE) | Members unpainted with minor surface rust throughout members. Minor surface rust on all welded connections. | | | C | | 8 |
| | STRINGERS OR GIRDERS (LONGITUDINAL) | None | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good Condition, minor delmaination or spalling at approach 1 abutment (2012 photo). | | | | | 7 |
| D | FOUNDATION | Good Condition | | | | | 7 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

**Flooding**

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

**Waterway**

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steep slope on approach 2. | 7 |

**Scour and Erosion**

| | |
|---|---|
| SCOUR/EROSION LOCATION | No scour or erosion observed during inspection. |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

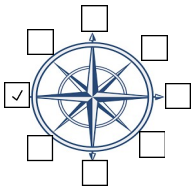
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

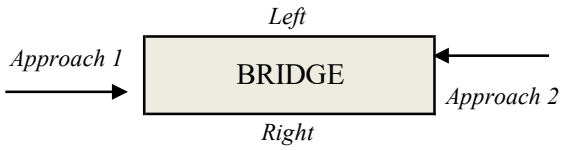
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 6 | WEATHER | Cloudy | TEMP | 20 | DATE | 2/25/17 |
| STRUCTURE NAME | Bunker Street Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Valley of the Moon | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Brian Weigan | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Damaged | No | None | Reflectors. Reflecting paint wearing and peeling off. |
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Manufacturer and Load Capcity. Load limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 3.5 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between rails 9 in. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 1.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with moderate surface rust throughout railng. Moderate surface rust on all railing welds. Minor section loss. | | | C | | 6 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Unpainted members with moderate surface rust throughout structure. Moderate surface rust on all connection welds. Minor section loss. | | | C | | 6 |
| T | DECK AND DECK OVERLAY | Some decking planks are splitting. Minor decay and moss throughout decking. 1 in and larger gaps and holes in decking, moderate wear on surface, split plank (2012 photos). | | | D<br>S<br>W | C | 5 |
| None | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). No expansion joint cover, debris in expansion gap (2012 photos). | | | | | 6 |
| S | FLOOR BEAMS (TRANSVERSE) | Unpainted members with moderate surface rust throughout members. Moderate surface rust on all connection welds. Minor section loss. | | | C | | 7 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Unpainted members with moderate surface rust throughout members. Moderate surface rust on all connection welds. Minor section loss. | | | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Erosion nearing abutment of approach 2. Minor cracks and spalling. | | | | C<br>SP | 7 |
| D | FOUNDATION | Possible settling on Northwest corner of approach 1. Erosion nearing foundation of approach 2. | | | | | 7 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steep slopes at both approaches. Erosion of banks nearing approach 2 abutment and foundation. | 7 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Nearing both approaches |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

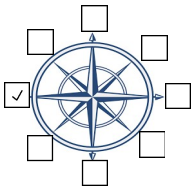
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

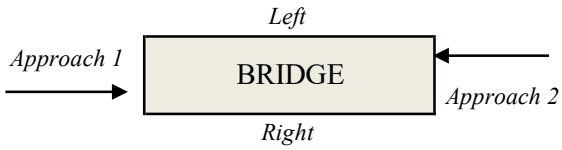
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 7 | WEATHER | Cloudy | TEMP | 20 | DATE | 2/25/17 |
| STRUCTURE NAME | Valley of the Moon Park Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Valley of the Moon Park | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Brian Weigand | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | | |
|---|---|---|
| TYPE OF UTILITIES | Other | Electrical, Sewer, and Water |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inpsection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 40 ft |
| SIGHT DISTANCE OBSTRUCTION | Light pole, trees, and brush obstructed sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.25 in Ice prevented measurement. Estimated. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inpsection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.125 in Ice prevented measurement. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors. Reflecting paint has minor chipping. |
| Other Sign | 3 | Approach 2 - Left | Damaged | Yes | Caution Walk Bicycles on Bridge and Ramp | Coution sign. (2) Slightly bent at connections. |
| Other Sign | 1 | Approach 2 - Left | Missing | No | Unknown | (1) Unknown missing sign. |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 3.2 ft | |
| TOE PLATE IS PRESENT | Yes | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | Yes | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 2.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Railng in good condtion. Minor damage to top of rail at approach 1. Minor checking througout rail system. Railing splices are separating, creating a snagging hazard (2012 photos). | | | S | | 7 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Electrical utility hanging from ends of deck are splitting the decking. Utility hangers loose. Minor checking and some decking plank edges elevated above others (2012 photos). | | | S | C | 7 |
| None | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| | FLOOR BEAMS (TRANSVERSE) | None | | | | | |
| T | STRINGERS OR GIRDERS (LONGITUDINAL) | Timber girders in good condition. | | | | | 8 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Closer inspection may be required. Access to abutments were limited, due to ice. | | | | | N |
| D | FOUNDATION | Closer inspection may be required. Access the foundations were limited, due to ice. | | | | | N |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| T | PIER(S) | Closer inspection may be required. Access to piers were limited, due to ice. Minor checking on approach 1 right side pier (2012 photo). | | | | | N |
| T | PIER CAP | Closer inspection may be required. Access to pier caps were limited, due to ice. | | | | | N |
| T | SHAFT BELOW CAP | Closer inspection may be required. Access to pier shafts were limited, due to ice. | | | | | N |
| D | FOUNDATION | No scour seen during inspeciton. Closer inspection may be required. Access to pier shafts were limited, due to ice. | | | | | N |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| | SLOPE | Closer inspection may be required. Access to bank slopes were limited, due to ice. | N |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Unknown |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

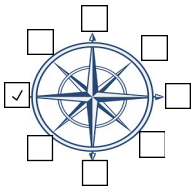
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

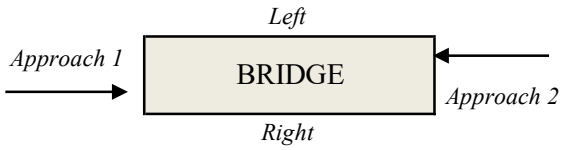
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 8 | WEATHER | Cloudy | TEMP | 22 | DATE | 2/25/17 |
| STRUCTURE NAME | West 19th Avenue Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Near C Street Community Garden | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Brian Weigand | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | None |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.125 in Ice prevented measurement. Estimated. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 2 - Rough |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | No obstruction to sight distance within 100ft. Brush near approach may need trimming. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.125 in Ice prevented measurement. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Missing | No | None | Reflectors. (2) Missing reflectors at approach 1. |
| | | | | | | |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 2.64 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Railing height too low, no toe plate, and spacing between rails are 1.96ft. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 2.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Timber posts splitting near hardware, throughout. Moderate checking length of post. Splintered tensile failure in railing mid bridge. Rusted nails protruding from railing. Railng ends at approach 1 damaged. | R<br>T<br>BN | L | D<br>S<br>W<br>C | C | 4 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Split planks and checking throughout decking. Minor to moderate decay throughout decking. Sizable gaps between planks (2012 photos). Remove debris from decking. | | | D<br>S<br>W | C | 5 |
| | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| T | FLOOR BEAMS (TRANSVERSE) | Diaphragms look to be in good condtion. Minor surface decay. | | | D | | 7 |
| T | STRINGERS OR GIRDERS (LONGITUDINAL) | Glulam has lamination separation mid span, interior and exterior mid to top of glulam girders range from 6-8" long with varying width. Minor surface decay. Decay testing recommended. | | | D | C | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good condition. Narrow banks. Waterway may be approaching abutments. High water may be a concern. | | | | | 7 |
| D | FOUNDATION | Good condition. Narrow banks. Waterway may be approaching abutments. High water may be a concern. | | | | | 7 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Narrow shallow sloped banks. High water may be a convern. | 6 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

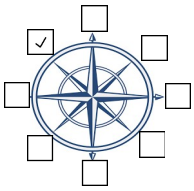
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

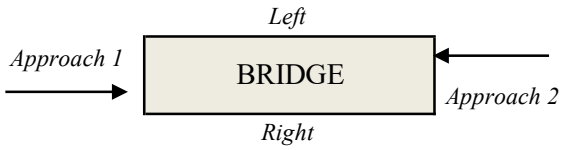
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 9 | WEATHER | Clear | TEMP | 25 | DATE | 3/11/17 |
| STRUCTURE NAME | Smith's Gorilla Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | C Street Community Garden | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Shelley Giraldo | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 58 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.125 in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.5 in Ice prevented measurement. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors |
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Manufacturer and load capacity. Load limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | | |
|---|---|---|---|
| RAILING HEIGHT | 4.5 | ft | |
| TOE PLATE IS PRESENT | No | | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing too large. | | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | | ft |
| VERTICAL CLEARANCE | | ft |

### Decking

| | | | |
|---|---|---|---|
| DECK OVERLAY MATERIAL | None | | |
| DECK OVERLAY THICKNESS | | in | |
| DECK MATERIAL | Timber | | |
| DECK THICKNESS | 2.5 | in | |
| EXPANSION JOINT GAP | 0.5 | in | Ice prevented measurement. Estimated (2012 Photos). |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with minor to moderate surface rust throughout railng. Minor surface rust on all railing welds. | | | C | | 6 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Bolt missing at the connect in the railing for both segements near approach 1. Vertical members on both sides damaged towards middle and ends of span. Possible traffic damage from trail maintenance. | BN<br>T | L | C<br>W | | 5 |
| T | DECK AND DECK OVERLAY | Decking planks are splitting and checking. Minor decay and moss throughout bottom of decking. | | | W<br>D | C | 6 |
| None | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). No expansion joint cover, debris in expansion joint, (2012 photos). | | | | | 6 |
| S | FLOOR BEAMS (TRANSVERSE) | Unpainted members with minor surface rust throughout members. Minor surface rust on all connection welds. Minor section loss. | | | C | | 6 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Unpainted members with minor surface rust throughout members. Minor to moderate surface rust on all connection welds. Minor section loss. Stringers have warped flanges. | B | | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 7. Bridge Substructure (Bridge Types A, B, D)

#### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good condition. Back wall of abutment approach 2 spalled and cracked near expansion joint (2012 photos). | | | | C<br>SP | 7 |
| D | FOUNDATION | Good condition. Narrow banks. Waterway may be approaching abutments. High water may be a concern. | | | | | 7 |

#### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

#### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Narrow banks. High water may be a concern. | 7 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

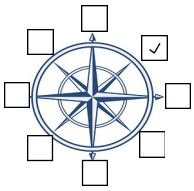
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

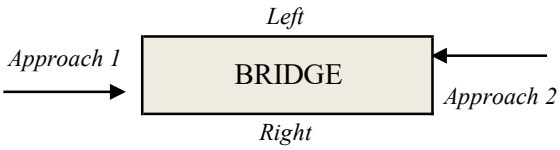
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 10 | WEATHER | Clear | TEMP | 25 | DATE | 3/11/17 |
| STRUCTURE NAME | Kosinski Fields Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Charles W. Smith Memorial Park | | | | | | |
| INSPECTOR 1 *(Name)* | Shelley Giraldo | | | | | | |
| INSPECTOR 2 *(Name)* | Samantha Caldwell | | | | | | |
| FEATURE CROSSED | Chester Creek Trail | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | None |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 45 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | ft |
| SIGHT DISTANCE OBSTRUCTION | Trees in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 100 in Ice prevented measurement. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Damaged | Yes | None | Reflectors. Reflective paint chipping off on all reflectors. |
| Other Sign | 2 | Both Approaches | Good | Yes | Bridge No. 1688 1985 | No load rating sign. Load limit may have decreased due to structural factors. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4.6 ft | |
| TOE PLATE IS PRESENT | Yes | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is too large. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 2.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Railing on both side are leaning outward due to frost action. Railing midspan bent. Rail sections are separating. Minor decay on glulam. Ledgers should be inpsected closer | BN<br>D | | D | C | 6 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Minor seasoning checks and decay. | | | S<br>D | | 6 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| T | FLOOR BEAMS (TRANSVERSE) | Diaphragms look to be in good condtion. Minor surface decay. | | | | | 7 |
| T | STRINGERS OR GIRDERS (LONGITUDINAL) | Top of girder is splitting and damaged approach 2. Laminations are beginning to separate. Protection paint peeling off glulam throughout. Many knots in lamination. Minor decay. Internal decay testing recommended. | | K | | | 5 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| T | ABUTMENT | Good Condition. | | | | | 7 |
| D | FOUNDATION | Foundation soil is being eroded by river approach 2. Bearing capacity decreased. | | | | | 6 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | No slope on both approaches. Approach 2 is eroded almost to the abutment. | 4 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Both Approaches. Foundation under approach 2 abutment is being eroded. |
| ESTIMATED DEPTH | 1.5 ft |
| ESTIMATED WIDTH | 8 ft Length of Abutment. |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

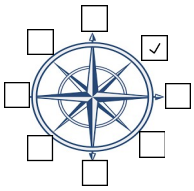
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

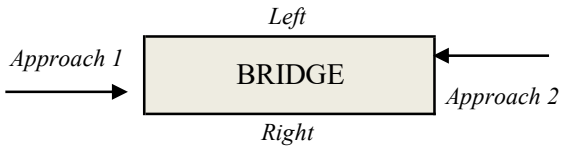
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 11 | WEATHER | Clear | TEMP | 25 | DATE | 3/11/17 |
| STRUCTURE NAME | West AFS Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | AFS | | | | | | |
| INSPECTOR 1 *(Name)* | Brian Weigand | | | | | | |
| INSPECTOR 2 *(Name)* | Samantha Caldwell | | | | | | |
| FEATURE CROSSED | Chester Creek Trail | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 56 ft |
| SIGHT DISTANCE OBSTRUCTION | Brush in the summer may obstruct sigh distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | ft |
| SIGHT DISTANCE OBSTRUCTION | Brush in the summer may obstruct sigh distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 100 in Ice prevented measurement. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Damaged | No | | Reflectors. Slight wear. (1) Reflector Damaged. (1) Reflector painted. |
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Load limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4.75 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is too large. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 1.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with moderate surface rust throughout railng. Moderate surface rust on all railing welds. Minor section loss. Bent railing | BN<br>D | | C | | 7 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Unpainted members with minor surface rust throughout structure. Minor surface rust on all connection welds. Minor section loss. | | | C | | 6 |
| T | DECK AND DECK OVERLAY | Some decking planks are splitting and checking. Minor decay and moss throughout decking. | | | D<br>W<br>S | | 6 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| S | FLOOR BEAMS (TRANSVERSE) | Unpainted members with minor surface rust throughout members. Minor to moderate surface rust on all connection welds. Minor section loss. Bent lateral bracing. | D<br>BN | | C | | 6 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Unpainted members with minor to moderate surface rust throughout members. Moderate surface rust on all connection welds. Minor section loss. | | | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good condition | | | | | 7 |
| D | FOUNDATION | Possible settlement on the right side of the bridge. Foundation below approach 1 abutment is sluffing out. Bearing capacity decreased. | | | | | 6 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steep slope. Foundation soil is sluffing out from under abutment. | 5 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Approach 1 abutment. |
| ESTIMATED DEPTH | 0.75 ft |
| ESTIMATED WIDTH | 3 ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

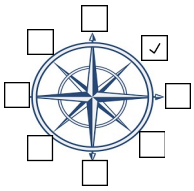
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

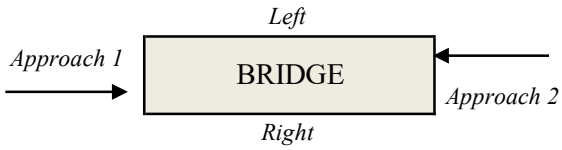
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 12 | WEATHER | Clear | TEMP | 25 | DATE | 3/11/17 |
| STRUCTURE NAME | East AFS Bridge | | | | | | |
| TRAIL NAME | Chester Creek | | | | | | |
| PARK NAME | AFS | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Samantha Caldwell | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 64 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors. Sight wear on all reflectors. |
| Other Sign | 2 | Both Approaches | Good | No | STEEL FABRICATORS 19744 | No load rating for bridge. Load Limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is too large. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | Asphalt | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 2.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Left railing beginning to lean inwards, possibly due to damaged vertical members in truss. Minor surface rust throughout. | BN | | C | | 6 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Many vertical members damaged, bent. Load rating decreased. Minor surface rust throughout. Traffic damage possibly from trail maintenance. | BN<br>T | | C | | 5 |
| T | DECK AND DECK OVERLAY | Some decking planks are splitting and checking. Minor decay and moss throughout decking. | | | W<br>S<br>D | C | 6 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| S | FLOOR BEAMS (TRANSVERSE) | Minor to moderate surface rust throughout. Minor section loss. Lateral bracing has been partially cut just before the weld at approach 2. | | | C | | 6 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Minor to moderate surface rust throughout. Minor section loss. Missing hardware connecting stringers and decking. Buckling occuring on stringer flanges. | B | L | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good condition | | | | | 7 |
| D | FOUNDATION | Possible settlement on the right side of the bridge. Foundation slope beginning to erode. | | | | | 6 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steep slope, banks are starting to erode. | 6 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Both approaches. |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

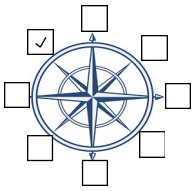
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

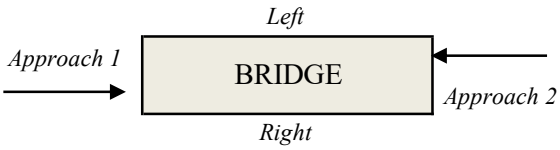
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 14 | WEATHER | Windy, Clear | TEMP | 10 | DATE | 3/14/17 |
| STRUCTURE NAME | Woodside Park Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Woodside Park | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Samantha Caldwell | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | | |
|---|---|---|
| TYPE OF UTILITIES | Electrical | Cables loose and hanging off of bridge. |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurement. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors. Slight wear on all reflectors. |
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Manufacturer and Load Capacity. Load limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4.54 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between rails 9" and no toe plate. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 1.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with minor surface rust throughout railng. Minor surface rust on all railing welds. | | | C | | 7 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Minor surface rust throughout structure and welds. Minor section loss. Vertical members on both sides bent and damaged toward middle of span. Damage possibly from trail maintenance. | T BN | | C W | | 5 |
| T | DECK AND DECK OVERLAY | Some decking planks are splitting and checking. Minor decay and moss throughout decking. | | | W D | C | 6 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| S | FLOOR BEAMS (TRANSVERSE) | Unpainted members with moderate surface rust throughout members. Moderate surface rust on all connection welds. Minor section loss. | | | C | | 6 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Unpainted members with minor surface rust throughout members. Minor surface rust on all connection welds. Minor section loss. Stringers have warped flanges at approach 1. | B | | C | | 5 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Minor vertical cracks. Honeycombing at approach 1 abutment. | | H | | C | 7 |
| D | FOUNDATION | Good condition. | | | | | 7 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steep slope, slight bank erosion. | 6 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Both approaches |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

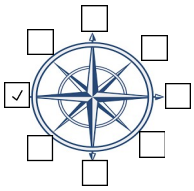
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

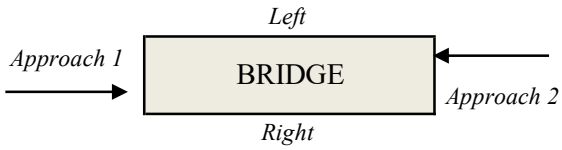
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 15 | WEATHER | Windy, Clear | TEMP | 10 | DATE | 3/14/17 |
| STRUCTURE NAME | Eastchester Park Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Eastchester Park | | | | | | |
| INSPECTOR 1 *(Name)* | Brian Weigand | | | | | | |
| INSPECTOR 2 *(Name)* | Shelley Giraldo | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | None |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 30 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.125 in Ice prevented measurent. Estimated. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer could obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.0625 in Ice prevented measurent. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Damaged | No | None | Reflectors. (1) Reflector damaged at approach 2. |
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Load limit may not be accurate to load rating. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4.47 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is too large. | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | in | |
| EXPANSION JOINT GAP | in | Ice prevented measurement. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Unpainted railing with moderate surface rust throughout railng. Moderate surface rust on all railing welds. Minor section loss. | | | C | | 6 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Unpainted members with moderate surface rust throughout structure. Moderate surface rust on all connection welds. Minor section loss. Pitting on diagonal memebers. | | | C | | 6 |
| T | DECK AND DECK OVERLAY | Some decking planks are checking and have minor splitting. Minor decay and moss throughout decking. Sizable gaps between planks (2012 photos). | | | D<br>S<br>W | C | 7 |
| | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). No expansion joint cover, debris in expansion gap (2012 photos). | | | | | 5 |
| S | FLOOR BEAMS (TRANSVERSE) | Unpainted members with minor to moderate surface rust throughout members. Minor to moderate surface rust on all connection welds. Minor section loss. | | | C | | 6 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Unpainted members with minor surface rust throughout members. Minor surface rust on all connection welds. Minor section loss. | | | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Good condition. Chester Creek nearing approach 2 abutment. | | | | | 7 |
| D | FOUNDATION | Foundation material on slope beginning to erode. No noticeable settlement. | | | | | 6 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Bank at approach 1 and 2 beginning to erode. Chester creek nearing approach 2 abutment. | 7 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Both approaches |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

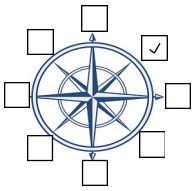
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

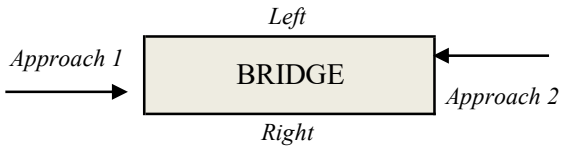
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | | WEATHER | Clear | TEMP | 16 | DATE | 3/14/17 |
| STRUCTURE NAME | Hillstrand Pond Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Greenbelt Park | | | | | | |
| INSPECTOR 1 *(Name)* | Samantha Caldwell | | | | | | |
| INSPECTOR 2 *(Name)* | Jared Kinney | | | | | | |
| FEATURE CROSSED | Chester Creek Trail | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☑ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (20XX). |
| SIGHT DISTANCE | ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (20XX). |
| SIGHT DISTANCE | ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Damaged | No | None | Reflectors. All are present but and severly worn. |
| Other Sign | 2 | Both Approaches | Damaged | No | No Fishing AK DoF&G | Sign on approach 2 damaged. |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | |
|---|---|
| RAILING HEIGHT | 4.28 ft |
| TOE PLATE IS PRESENT | Yes |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is too large. |

### Truss (Bridge Type D only)

| | |
|---|---|
| TRUSS HEIGHT | ft |
| VERTICAL CLEARANCE | ft |

### Decking

| | |
|---|---|
| DECK OVERLAY MATERIAL | Asphalt |
| DECK OVERLAY THICKNESS | 1.5 in |
| DECK MATERIAL | Other |
| DECK THICKNESS | 25 in |
| EXPANSION JOINT GAP | in |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILING | Structure is a culvert. | | | | | |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Structure is a culvert. | | | | | |
| | DECK AND DECK OVERLAY | Structure is a culvert. | | | | | |
| | EXPANSION JOINTS | Structure is a culvert. | | | | | |
| | FLOOR BEAMS (TRANSVERSE) | Structure is a culvert. | | | | | |
| | STRINGERS OR GIRDERS (LONGITUDINAL) | Structure is a culvert. | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | ABUTMENT | Structure is a culvert. | | | | | |
| | FOUNDATION | Structure is a culvert. | | | | | |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | Multiple Pipes |
| FLOW RELATIVE TO TOP OF CULVERT | 18 in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILS | Good condition. Minor wear to protective paint on left side. | | | | | 7 |
| AS | SURFACE | Could not assess during inspection, condition based on provided summer photo (2012). Good condition and minor asphalt cracks (2012 photos). | | | | C | 7 |
| S | CULVERT | Closer inspection may be required. Access to culverts were limited due to thin ice. Culverts seemed to be clear of debris. Culvert rusting near waterline (2012 photos). | | | C | | N |
| C | PARAPETS | Good condition. Closer inspection may be required. Crack on the left side center of bridge. | | | | C | 6 |
| C | INLET APRON | Inlet apron damaged and not functioning properly. | | | | C | 5 |
| C | OUTLET APRON | Closer inspection may be required. Apron could not be inspected due to ice buildup in and around outlet. | | | | | N |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| C | SLOPE | Bank protection in good condition, Closer inspection required. Scouring occuring between culverts and banks. | N |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Extent of scour between culverts unknown. |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

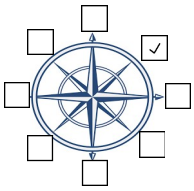
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

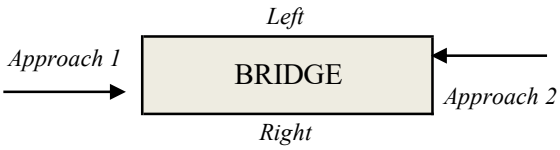
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 3 | WEATHER | Overcast | TEMP | 30 | DATE | 2/18/17 |
| STRUCTURE NAME | Tikishla Park Bridge North | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Tikishla Park | | | | | | |
| INSPECTOR 1 *(Name)* | Samantha Caldwell | | | | | | |
| INSPECTOR 2 *(Name)* | Shelley Giraldo | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summber photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Beyond 100ft tress and brush obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.5 in Ice prevented measurement. Estimated. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summber photo (2012). |
| SIGHT DISTANCE | 50 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees, in the summer may, obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 1.5 in Ice prevented measurement. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Missing | No | None | Reflectors, (3) Missing. |
| | | | | | | |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | | |
|---|---|---|---|
| RAILING HEIGHT | 4 | ft | |
| TOE PLATE IS PRESENT | Yes | | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is 9.5". | | |

### Truss (Bridge Type D only)

| | | | |
|---|---|---|---|
| TRUSS HEIGHT | | ft | |
| VERTICAL CLEARANCE | | ft | |

### Decking

| | | | |
|---|---|---|---|
| DECK OVERLAY MATERIAL | None | | |
| DECK OVERLAY THICKNESS | | in | |
| DECK MATERIAL | Timber | | |
| DECK THICKNESS | 3 | in | |
| EXPANSION JOINT GAP | 1.5 | in | Ice prevented measurement. Estimated. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Damaged railing at approach 1. Left railing bowed out and noticable sagging. Perserved wood has minor to moderate decay. Damaged railing posts. Some missing hardware in posts. | D<br>T | L | D<br>W | | 5 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Could not assess during inspection, condition based on provided summer photo (2012). Wood frame separating from girder (1"), approach 2. Settlement has created an elevation difference at approach 2. | | | D | | 6 |
| None | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). No expansion joint cover, debris in expansion gap, and settlement has created a gap at interface (2012 photos). | | | | | 6 |
| | FLOOR BEAMS (TRANSVERSE) | None | | | | | |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Extensive loss of protective paint on girders. Moderate surface rust throughout members. Minor to moderate section loss of steel. Wood frame separating from girder (1"), approach 2. | | L | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Spalling under girder. Honeycombing at back face of amutment. No bearing pad between abutment and girder. | | H | W | C<br>SP | 7 |
| D | FOUNDATION | Possible settlement at approach 2. | | | | | 6 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

## 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

## 9. Hydrology

### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Bank erosion very close to approach 2. May be causing settlement. | 6 |

### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Approach 2, undermining bank |
| ESTIMATED DEPTH | 0.25 ft |
| ESTIMATED WIDTH | 0.5 ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

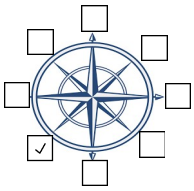
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

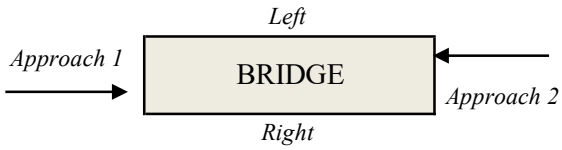
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 4 | WEATHER | Overcast | TEMP | 30 | DATE | 2/18/17 |
| STRUCTURE NAME | Tikishla Park Bridge South | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Tikishla Park | | | | | | |
| INSPECTOR 1 *(Name)* | Jared Kinney | | | | | | |
| INSPECTOR 2 *(Name)* | Shelley Giraldo | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | Electrical |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 0 - Smooth |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (20XX). |
| SIGHT DISTANCE | 53 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summer photo (20XX). |
| SIGHT DISTANCE | 66 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors. Slightly worn. |
| | | | | | | |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | |
|---|---|
| RAILING HEIGHT | 4 ft |
| TOE PLATE IS PRESENT | Yes |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between rails is 8". |

### Truss (Bridge Type D only)

| | |
|---|---|
| TRUSS HEIGHT | ft |
| VERTICAL CLEARANCE | ft |

### Decking

| | |
|---|---|
| DECK OVERLAY MATERIAL | None |
| DECK OVERLAY THICKNESS | in |
| DECK MATERIAL | Timber |
| DECK THICKNESS | 2.5 in |
| EXPANSION JOINT GAP | in Ice prevented measurent. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Rails have minor to moderate decay. Minor damage on some rail posts and lower railing at the ends. Minor checking and decay on toe plate. | T | | D<br>S | | 5 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Minor to moderate decay on planks. | | | D | C | 7 |
| None | EXPANSION JOINTS | Could not assess during inspection. No expansion joint cover, debris in expansion gap (2012 photos). Approach 1 has ponding near expansion joint. | | | | | N |
| | FLOOR BEAMS (TRANSVERSE) | None | | | | | |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Minor section loss on both girders. Protective paint has flaked off. Bolts connecting to decking have begun to corrode. | | | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 7. Bridge Substructure (Bridge Types A, B, D)

#### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Minor spalling of abutments under beams. Honeycombing on abutment approach 2. | | H | | C<br>SP | 7 |
| D | FOUNDATION | Settlement on approach 1 of bridge. Approach 1 abutment beginning to scour. Creek nearing abutment at approach 1. Foundation, approach 2 sluffing away from abutment (2012 photos). | | | | | 6 |

#### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

#### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Slope at approach 1 has been eroded away, existing slope is steep. | 6 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Chester creek nearing approach 1. |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

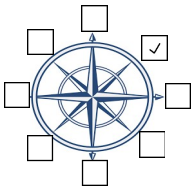
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

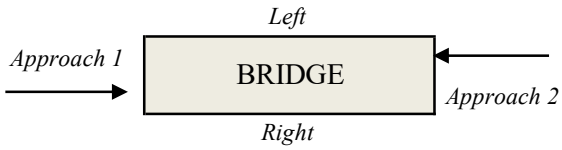
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 2 | WEATHER | Snowing | TEMP | 25 | DATE | 2/18/17 |
| STRUCTURE NAME | East University Lake Park Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | University Lake Park | | | | | | |
| INSPECTOR 1 *(Name)* | Samantha Caldwell | | | | | | |
| INSPECTOR 2 *(Name)* | Brian Weigand | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | None |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 98 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 73 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees and brush in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Load Limit | 2 | Both Approaches | Good | No | Max Load 10,000 lbs | Load Limit may not be accurate to load rating. |
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 3.48 ft | |
| TOE PLATE IS PRESENT | No | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | No toe plate and spacing between rails is 6". | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 1.5 in | |
| EXPANSION JOINT GAP | in | Ice prevented measurent. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Minor to Moderate surface rust on railing members and welds. Missing bolts on wooden railing. Excessive deflection in horizontal railing members. | D | L | C | | 6 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Minor to moderate surface rust on all members and welds under bridge. Minor section loss to most members. Remove debris on surface. | | | | | 6 |
| T | DECK AND DECK OVERLAY | Good condition. | | | | | 7 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| S | FLOOR BEAMS (TRANSVERSE) | Minor to moderate surface rust on all members and welds under bridge. Minor section loss to most members. Welds have rust flaking off 7 and 8 floor beams from approach 1, right side. Remove debris on surface. | | | C | | 5 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Minor to moderate surface rust on all members and welds under bridge. Minor section loss to most members. Remove debris on surface. | | | C | | 5 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 7. Bridge Substructure (Bridge Types A, B, D)

#### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Minor spall on abutment approach 1.<br>Verital crack in abutment approach 2. | | | | C | 7 |
| D | FOUNDATION | Good condition | | | | | 7 |

#### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

#### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | Yes |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Bank slightly slumping with steep slopes that may cause the bank to erode easier. | 6 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Approach 1 |
| ESTIMATED DEPTH | ft |
| ESTIMATED WIDTH | ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

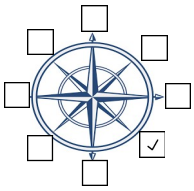
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

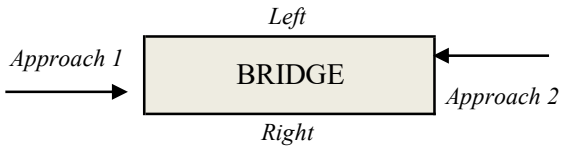
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 1 | WEATHER | Snowing | TEMP | 30 | DATE | 2/18/17 |
| STRUCTURE NAME | West University Lake Park Bridge | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | University Lake Park | | | | | | |
| INSPECTOR 1 *(Name)* | Shelley Giraldo | | | | | | |
| INSPECTOR 2 *(Name)* | Samantha Caldwell | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 55 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees in the summer may obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | |
| SURFACE DESCRIPTION | |
| SIGHT DISTANCE | 31 ft |
| SIGHT DISTANCE OBSTRUCTION | Brush in the summer may obstruct sigh distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | in Ice prevented measurent. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Good | Yes | None | Reflectors |
| Load Limit | 2 | Both Approaches | Good | Yes | 85 psf, Manufacturer information, and bridge information. | |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Clearance, Load Limit, Speed Limit, Other Sign;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right, Both Approaches;* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 3.4 | ft |
| TOE PLATE IS PRESENT | Yes | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between rails is just over 4". | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | | ft |
| VERTICAL CLEARANCE | | ft |

### Decking

| | | | |
|---|---|---|---|
| DECK OVERLAY MATERIAL | None | | |
| DECK OVERLAY THICKNESS | | in | |
| DECK MATERIAL | Timber | | |
| DECK THICKNESS | 2.5 | in | |
| EXPANSION JOINT GAP | | in | Ice prevented measurent. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| S | RAILING | Minor surface rust where paint has chipped. Chipped paint throughout railing. | | | C | | 7 |
| S | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | Paint flaking off near truss connections and welds. Chipped paint throughout truss members. | | | C | | 7 |
| T | DECK AND DECK OVERLAY | Structural members supporting decking has minor surface rust. Minor decay and checking throughout decking. | | | D<br>S | C | 7 |
| | EXPANSION JOINTS | Could not assess during inspection. 2012 photos don't show a expansion joint closer inspection may be required. | | | | | N |
| S | FLOOR BEAMS (TRANSVERSE) | Debris buildup on top of of lateral members causing paint to chip and surface rust throughout all members under the structure. | | | C | | 7 |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Paint peeling off of top of members in contact with surface decking. Chipped areas have surface rust. | | | C | | 7 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Vertical crack in approach 1 abutment. | | | | C | 7 |
| D | FOUNDATION | Good condition. | | | | | 7 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Steel slope on approach 1 may cause slope material to be eroded easier. | 7 |

#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Slight erosion on approach 1 slope. |
| ESTIMATED DEPTH | 3 ft |
| ESTIMATED WIDTH | 2 ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

## Appendix C – Structural Analysis Report: Tikishla Park Bridge North

[Page intentionally left blank]

APRIL 2017

# Structural Analysis Report

## *TIKISHLA BRIDGE NORTH*

PEDESTRIAN BRIDGE PROJECT
MOA PROJECT B

**Jared Kinney**
Shelley J. Giraldo
Brian Weigand
Samantha Caldwell
SEAWOLF ENGINEERS

# Table of Contents

# List of Figures



# Acronyms

| | |
|---|---|
| AASHTO | American Association of State Highway and Transportation Officials |
| AISC SCM | American Institute of Steel Construction Steel Construction Manual |
| ASCE | American Society of Civil Engineers |
| LRFD | Load and Resistance Factor Design |
| MOA | Municipality of Anchorage |
| NDS | National Design Specification for Wood Construction |
| O.C. | On Center |
| Psf | Pounds per Square Foot |

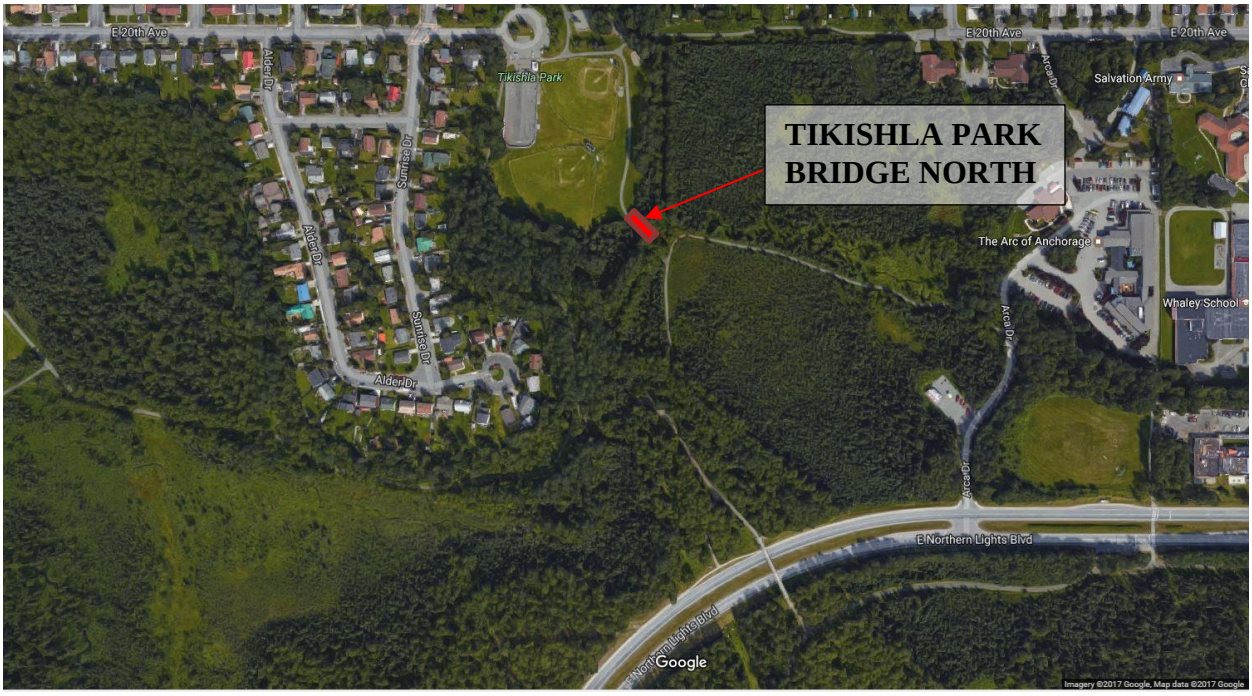
## Executive Summary

The Municipality of Anchorage Parks and Recreation's mission is to keep Anchorage's trails well maintained and contribute to the health and safety of the community. In 2014, a pedestrian bridge (North Westchester Lagoon Bridge) on Anchorage's Coastal Trail failed as a utility truck was driving across the structure. To forward their mission and in response to the failure, Anchorage Parks and Recreation contracted with Seawolf Engineering to create a bridge inspection program, inspect fifteen (15) pedestrian bridges along the Chester Creek Trail, and structurally analyze the bridge that appeared to be in the worst condition, the Tikishla Park Bridge North. Seawolf Engineering analyzed the bridge to determine if the structure is adequate for normal pedestrian traffic and whether or not a utility vehicle could cross the structure safely. Seawolf Engineering also provided recommendations after conducting the analysis.

## Introduction

The full structural analysis of the Tikishla Park Bridge North supports the Parks and Recreation's mission to keep Anchorage's trails well maintained and contributes to the health and safety of the Anchorage community. Figure 1 shows the location of Tikishla Park Bridge North.

*Figure 1. Bridge Location (Google Maps)*




The Tikishla Park Bridge North was selected for the structural analysis based on its age and current condition. The bridge, which crosses Chester Creek, is located just south of Tikishla Park. Site visits to the bridge were conducted on the February 18, March 13, and March 14, 2017. Original bridge documents were provided by MOA for the investigation (see Appendix A). The documents were reviewed and referenced during analysis of the bridge. The structural analysis was conducted using the "North Lagoon Bridge Failure Assessment" provided by Stantec as a model. Based on

the analysis results, Seawolf Engineers recommends that Parks and Recreations posts signage, places bollards, or rehabilitates/replaces the bridge (see Appendix D).

## Description

The Tikishla Park Bridge North spans approximately 30' across Chester Creek. The simply supported pedestrian bridge has a pressure treated timber frame and decking which rests on a (2) 2x8 spacers connected to (2) W10x33 steel girders by 1/2" steel bolts spaced 3' O.C. (on center). The bridge decking is framed (top and bottom) between 6x6 timbers, as depicted in Figure 2. A wooden railing system is attached to the outside face of the timbers with railing posts at 5' O.C. The two steel girders are symmetrically placed 17 7/16" O.C. from the edge of the decking and are spaced 6'-1 1/2" apart. The shallow foundation system is composed of the girders resting on the concrete abutment. Type II classified fill/backfill compacted to 95% was used for the bearing soil.

*Figure 2: Timber Frame*


Site visits suggest that no rehabilitation of the bridge has occurred since its construction. Original plan drawings were completed in 1985 as part of Schedule B of the Chester Creek Greenbelt Development project. MOA was only able to provide 2 out of 16 sheets (sheets 6 and 15) of the plan set. There were no general notes, specifications, design codes, or design criteria provided on the obtained plan sheets. Additionally, no load limit was demarcated on the provided plan sheets, but there were callouts for installing bollards and signage stating "No Unauthorized Motor Vehicles." During the bridge inspection and multiple site visits, no load limit signs, bollards, or signage prohibiting unauthorized vehicles were observed.

## Site Observations

Seawolf Engineers conducted a bridge inspection on February 18, 2017. The inspection was done during the winter months when snow covered most of the decking. The inspection was done as thoroughly as possible given the conditions. MOA provided supplemental photos of the same bridge, taken in 2012, which were used to further investigate the condition of the bridge. The 2017 inspection report of the Tikishla Park Bridge North can be found in Appendix C.

Seawolf Engineers conducted several site visits on March 13 and 14, 2017 to confirm bridge dimensions. All timber and steel members and dimensions matched the specified dimensions except for the placement of the W10x33 steel girders. The plans specified that the W10x33 steel girders be placed 16" O.C. from the edge of the decking and spaced 6'- 4" apart. The as built dimension were 17-7/16" O.C. from the edge of the decking and spaced 6'-1 1/2" apart. No destructive tests were conducted on the timber frame and girders of the Tikishla Park Bridge North.

From the inspection, Seawolf Engineers concluded that prolonged exposure to moisture and other elements have caused the protective paint and staining of the pressure treated wood to deteriorate, allowing the decking and railing of the bridge to decay. At the time of inspection, most of the pressure treated wood had fungi, mold, and moss. The worst decay was observed near the abutments and in close proximity to the ground. The top of the decking could not be observed, due to the ice and snow accumulation at the time of inspection. The 2012 summer photos were used to rate the surface condition of the decking. The photos show some checking and splitting of the decking.

*Figure 3: Worst Corrosion on Girders*


The girders were found to be in fair shape, despite flaking rust, as depicted in Figure 3. Measurements, taken during site visits, confirmed that W10x33 beams were used, as called out in the original plan documents. A section loss analysis showed that section loss was insignificant. The analysis was performed by comparing the average dimensions of W10X33, provided by the American Institute of Steel Construction Steel Construction Manual 14$^{th}$ Edition (AISC SCM), with the measured dimensions of the Tikishla Park Bridge North. The percent differences found between the SCM average dimension and measured dimensions were very small and only minor section loss was exhibited at various locations along the length of the beam.

*Figure 4: Profile view of Sagging Bridge Frame*

When the waterway alignment from the plan sheets and the current waterway alignment were compared, it was determined that Chester Creek has meandered to the south. The creek has begun to encroach upon the southern abutment of Tikishla Park Bridge North. Possible settlement was noted in the inspection report at the southern abutment. The frame and railing were visibly sagging, as portrayed in Figure 4. It is possible that erosion of the Type II classified fill, combined with high moisture content and poor native soil properties, contributed to the settlement. A more thorough geotechnical investigation would need to be conducted for confirmation.

*Figure 5.Frame and Girder Separation*

At the south end of the bridge, the 2x8 spacer and girder were separating from the decking (shown in Figure 5), which could be due to settlement. The length of the separation is approximately 4’ long and 1” wide, and in this area the (2) 3 1/2" lag screws were stripped from the 2x8 spacer. Debris accumulation at the end of the girder prevents contact between the timber frame and the girder year round. The gap was assumed to be insignificant for the analysis because large loading, such as a H 5 design vehicle, would likely cause the frame to deflect and come into contact with the girders.

## Analysis

To perform the structural analysis of the bridge, the Stantec Failure Investigation Report on the North Westchester Lagoon Bridge was used as a model. To determine required design load combinations, design load factors, and ultimate material strengths, the following specifications were used:

- American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Guide Specification for the Design of Pedestrian Bridges, 2009;
- AASHTO LRFD Bridge Design Specifications, 6$^{th}$ Edition with 2015 Interim Revisions,
- American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)
- 2015 American Wood Council (AWC) National Design Specification for Wood Construction (NDS);
- American Institute of Steel Construction (AISC) Steel Construction Manual (SCM), Fourteenth Edition

As per the AASHTO specifications Limit State Strength I was checked to determine the max allowable dead and live loadings. Seismic, wind, and lateral loadings were not considered, due to the scope of the analysis. Using Strength I, the decking and girders were analyzed considering the following two scenarios.

- Pedestrian Load + Snow Load + Dead Load
- Vehicle Load + Dead Load

For analysis, an unreduced pedestrian live load of 90 psf was used, as recommended by AASHTO. A snow load of 42 psf was calculated for the Anchorage area and this usage, as per ASCE 7-10. The dead load, or self-weight, of the bridge was calculated using member dimensions and assumed materials.

An H-5 design vehicle was chosen to model a utility truck due to the clear deck width of 8'. The H-5 design vehicle has single tire on the front and rear axles. Each front and rear tire can be modeled as a 1000 lbs and 4,000 lbs point load, respectively. The contact area of the tires is estimated to be 10"x20" by AASHTO. The lateral distance center to center of tires is 6', while the longitudinal distance from the center of the front axle to the center of the back axle is 14'.

Allowable bending, shear, and bearing stresses in wood members were calculated from the National Design Specifications for Wood Construction (NDS) provision. Ultimate stresses due to the Strength I load combination were manually calculated. Since available design documents did not specify materials, hemlock-fir was assumed to be the timber species. The depth of decay was assumed to be 1/8" thick on all faces of the timber members. Dimensioned lumber properties were adjusted accordingly. Timber decay was assumed to have no stress capacities.

Allowable bending, shear and deflection in the girders were calculated using the AISC Steel Construction Manual (SCM). The structural analysis program RISA-3D Version 14 was used to determine ultimate stresses. The W10x33 was assumed to be A992 steel, due to the preferred material specification for the type of beam listed in the AISC SCM. It was assumed that the decking does not provide lateral bracing for the girders and that section loss is negligible.

The decking is adequate for the Pedestrian + Snow + Dead loading. However, the decking failed in shear under the Dead + Live (Vehicular) loading. It is important to note that these calculations are based on an assumed timber species of hemlock-fir and on an assumed extent of decay. If another species had been assumed, the decking may not have failed in analysis. To summarize, the decking flexure capacity is adequate but the shear capacity parallel to the grain of the timber of the decking is not.

The girders are inadequate for Pedestrian + Snow + Dead loads. Even without the snow load applied to the structure, the girders still do not have the required strength to hold the AASHTO recommended 90 psf pedestrian live load. 90 psf is equivalent to about one hundred fifty-two (152) 160-lbs people standing on the deck of the bridge. While it is unlikely that this many people would ever cram onto the Tikishla Park Bridge North, the girders should be able to withstand this load in order to be up to code. Though live load reductions could not be applied to the structure, the bridge is adequate for normal pedestrian loads.

The girder is unlikely fail due to Dead + Live (Vehicular) loads. Thus, assuming the timber decking could hold the weight of the H-5 design vehicle, the girders could support the H-5 design vehicle. However, the girders will exhibit more deflection than allowed per specification. Again, it is important to remember that the steel type was assumed; if another type of steel was used, the girders may not be adequate to hold the design vehicle. Torsion was not considered in the analysis, under the assumption that design vehicles tires will drive directly over the girders.

Full calculations for the bridge analysis are provided in Appendix B. Acquiring the full construction plans for the Schedule B of the Chester Creek Greenbelt Development project is recommended for a more accurate analysis.

# Conclusion

The Tikishla Park Bridge North, built around 1985, is an aging and deficient pedestrian bridge in the Municipality of Anchorage. The bridge will continue to deteriorate unless rehabilitated or replaced. The analysis showed that the structure is adequate for regular pedestrian traffic in combination with heavy snow loads for both the decking and the girders. However, the decking could not support a 10,000 lbs design vehicle, due to excessive shear forces. The girders are not up to today's design standards for pedestrian live loads of 90 psf. Assuming the decking would not fail, the girders could support an H-5 design vehicle, but they would experience excessive deflection.

Summary points from the analysis:

- Normal pedestrian loading would not cause the deck to fail.
- The steel girders are not up to code as they could not withstand a pedestrian load of 90 psf.
- The girders, but not the decking, could support the design vehicle. However, deflection would be more than allowed as per the SCM.
- A copy of the complete original construction documents should be found so that accurate material properties from the material specification could be used for an accurate analysis.

# Recommendations

Action should be taken for the Tikishla Park Bridge North. The original plan sheets provided by MOA called for installing bollards and signage stating "No Unauthorized Motor Vehicles." During the bridge inspection and multiple site visits, no bollards, signage prohibiting vehicles, or load limits were observed. It is recommended that bollards and signage be installed immediately (see Appendix D). Removable bollards are recommended since they can be removed for community events that require the full width of the trail and since they can be easily replaced.

Replacement of the railing is recommended. The deck and timber frame should be rehabilitated by applying protective paint or stain to slow decay. If the decking requires replacement, the entire timber frame should be replaced. Replacement of just decking would not be an efficient use of time and money, since the railing and 6x6 timber posts must be removed in order to replace the decking.

# Appendix A – Original Construction Drawings

[Page left intentionally blank]

# PLANT MATERIALS LEGEND (SHEET 6 ONLY)

| SYMBOL | DESCRIPTION | QUANT | SIZE | NOTES |
|---|---|---|---|---|
| ⊙ | PICEA GLAUCA (WHITE SPRUCE) | 16 | 5'-6' | 24"-26" ROOTBALL |
| ⊕ | BETULA PAPYRIFERA (PAPER BIRCH) | 16 BASE BID<br>16 ADD ALT<br>32 TOTAL | 6'-8' | 1¼" CAL. |
| | SCHEDULE 'B' SEED MIX W/ TOPSOIL | 35,000 # | | 3 lbs/ 1000 SQ FT |

NOTES!

1. LIMITS OF CLEARING TO BE STAKED BY CONTRACTOR AND FIELD VERIFIED BY LANDSCAPE ARCHITECT PRIOR TO COMMENCEMENT OF CLEARING ACTIVITIES
2. BRIDGE CROSSING 'A' & 'B' TO BE FIELD LOCATED BY LANDSCAPE ARCHITECT

7/15 1/15 CREEK CROSSING 'B'
NEW 30' LENGTH BRIDGE
T.B.M. #606 EXISTING FOOTTRAIL ELEVATION -100 ±

⚠ REMOVABLE BOLLARD (1) 4/14
7/14 (2) WOOD BOLLARD
INSTALL OWNER-SUPPLIED 'NO UNAUTHORIZED MOTOR VEHICLES' SIGN (COST INCIDENTAL TO CONSTRUCTION)
LIMIT OF TRAIL SUBGRADE CONSTRUCTION EXISTING PATH ALIGNMENT TO BE GRADED AND PAVED TO 16TH AVE
4/14 REMOVABLE BOLLARD (1)
20' R MIN. (TYP.)
WALKWAY EASEMENT
TRAIL GRADIENT @ 5% ±
DRAINAGE CREEK CROSSING 'C'
INSTALL 36 x 22 C.M.P. SHAPE III GAUGE 14 -ZOLF W/ FLARED END SECTIONS
- TRAIL SECTION TO BE 10' WIDTH AT DRAINAGE CREEK CROSSING ONLY.
- CULVERT TO HAVE 30" GRAVEL COVER UNDER BIKE TRAIL SECTION 8/14
- PAVING TO MEET AND MATCH E. 19TH AVE
(4) WOOD BOLLARDS 7/14
(1) REMOVABLE WOOD BOLLARD 4/14
INSTALL OWNER-SUPPLIED 'NO UNAUTHORIZED MOTOR VEHICLES' SIGN (COST INCIDENTAL TO CONSTRUCTION); TO BE MOUNTED ON ONE OF BOLLARDS.
⚠ 10' 10' ϕ SHAPE III CULVERT WITH FLARED END SECTIONS; DITCH TO DRAIN
EXISTING HEADWALL
THIS TRAIL SECTION/CULVERT & ADD ALTERNATES #01-9, 14, 15, 16
⚠ ADDITIONAL TRAIL
5/14 ASPHALT BIKE TRAIL
PRESERVATION WETLAND
SEE SHEETS 3, 4 & 5
MATCH LINE
EL 2

SELECTIVE CLEARING AT DIRECTION OF LANDSCAPE ARCHITECT COST INCIDENTAL
MATCH EXISTING ASPHALT EDGE
TO NORTHERN LIGHTS BRIDGE
SAWCUT EXISTING ASPHALT-COST INCIDENTAL TO CONSTRUCTION
REMOVE A.C. PAVING, SCARIFY TOPSOIL & SEED (SCHEDULE B)
INSTALL: 41 TREES
25 BIRCH (6'HT)
16 WHITE SPRUCE (5'-6' HT)
@ DIRECTION OF LANDSCAPE ARCHITECT
T.B.M. TOP OF REBAR 109.18 40'± W/OF BRIDGE
CONSTRUCTION ACCESS - 10 FT X 55 L.F. MATCH EXISTING BIKE TRAIL EDGE AND CLEARED PATH/FOOT TRAIL
⚠ A.C. TRAIL TO MATCH @ SHT. 3; 600 L.F. ±
TRAIL & BRIDGE ALIGNMENT TO BE FIELD STAKED BY LANDSCAPE ARCHITECT TRAIL PROFILE TO BE APPROXIMATELY 4% ±
CHESTER CREEK
1/15 6/15 CREEK CROSSING 'A'
NEW 30' LENGTH BRIDGE
FINISH DECK ELEV. 109.9 LOCATION AS DIRECTED BY L.A. - APPROX 40' N OF EAST BRIDGE
PROVIDE SMOOTH TRANSITION TO MATCH EXISTING ASPHALT EDGE
SAWCUT EXISTING ASPHALT-COST INCIDENTAL TO CONST. (TYP.)
REMOVE EXISTING BRIDGE, ROUTE & DELIVER INTACT TO PARKS AND RECREATION STORAGE AREA AT DIRECTION OF L.A.
NOTE! CONTRACTOR TO MAINTAIN FREE AND OPEN ACCESS TO EXISTING TRAIL DURING CONSTRUCTION DO NOT REMOVE EXISTING BRIDGE AND TRAIL UNTIL NEW BRIDGE IS COMPLETE AND NEW TRAIL IS PAVED FROM BOTH BANK OF CREEK FOLLOWING CONSTRUCTION

EXISTING BARRICADE
EXISTING BASEBALL FIELD
EXISTING HOCKEY RINK
SEE SHEETS: 3, 4, 5 & 12 FOR IMPROVEMENTS TO THIS AREA
E. 20TH AVE.

NORTH
Scale 1"=50'
0 50 100 200

AS-BUILT

## LEGEND

| SYMBOL | DESCRIPTION |
|---|---|
| | EXISTING CONTOUR |
| | PROPOSED CONTOUR |
| | EXISTING FOOTPATH 10,500 SQ.FT. ± — SCARIFY TO A DEPTH OF 6" & PLACE 2" TOPSOIL W/ SCHEDULE B SEED MIX |
| | 8' WIDTH PAVED BIKE TRAIL — EXACT ALIGNMENT TO BE FIELD LOCATED BY LANDSCAPE ARCHITECT (5/14) |
| N.L.C. | 6'-WIDTH GRAVEL TRAIL N.L.C. |
| | LIMIT OF PRESERVATION WETLANDS |
| | DRAINAGE DITCH |
| | CHESTER CREEK |
| | EXISTING ASPHALT TRAIL |
| | PROPOSED TRAIL (GRAVEL & ASPHALT) |
| | EXISTING ASPHALT TRAIL TO BE REMOVED |
| | AREA TO BE CLEARED & GRUBBED |
| • | WOOD BOLLARD (7/14) |
| ⊙ | REMOVABLE WOOD BOLLARD (4/14) |
| | EXISTING TREES |
| | ADD ALTERNATE TRAIL SECTION |

LAND DESIGN

Park Identification 322
Plan Set Number 11

| FIELD BOOKS | TRN NO. | LOCATION | ELEV. |
|---|---|---|---|
| DESIGN | 405 | 80' N. of BRIDGE CROSSING 'B' | 109 ± |
| STAKING | 405 | 80' N of BRIDGE CROSSING 'B' | 100 ± |
| ASBUILT | | | |
| | | | |
| | | | |
| CONTRACTOR | BASIS OF | | |
| INSPECTOR | | | |
| CONSTRUCTION RECORD | VERTICAL DATUM | | |

| DATA | BY | V | DATA | BY | V |
|---|---|---|---|---|---|
| BASE | | | TBLE | | |
| TOPO | | | RLSC | | |
| PROFILE | | | DESIGN | | |
| SAN SEWER | | | QUANTITIES | | |
| STORM SEWER | | | MUN. PRELIM. CHECK | | |
| WATER | | | MUN. FINAL CHECK | | |
| GAS | | | CODED BY | | |
| PLAN CHECK | | | | | |

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 10-14-86 | AS-BUILT | Rath. |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| REVISIONS | | | |

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

ANCHORAGE ALASKA — ENGINEERS

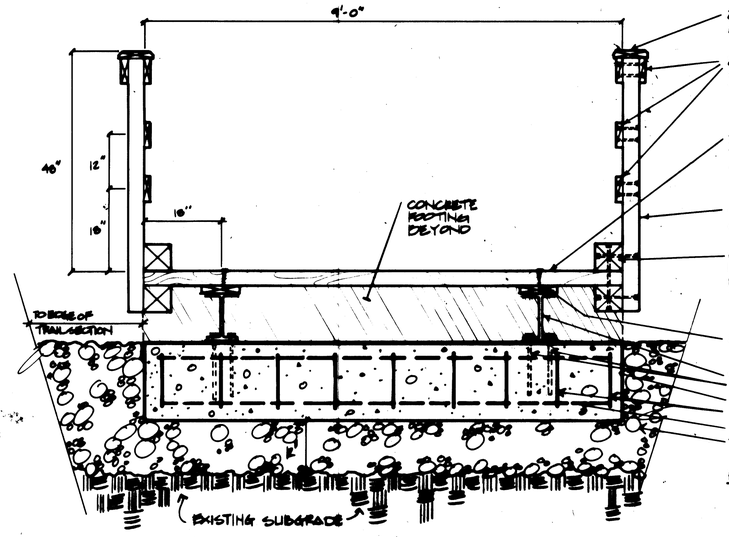
STATE OF ALASKA — 49TH — T. Spurlock — No. 2822-S — SEAL

PUBLIC WORKS DEPARTMENT

**Chester Creek Greenbelt Development**
**Schedule B Tikishla Park** 84-9-2
**TRAILS AND BRIDGES**

SCALE 1"=50'-0" | DATE 5/27/86 | GRID 15E/16W | SHEET 6 of 16
ACCT. NO.

FILE NO.




2X6 WOOD CAP ATTACH W/ 16d NAILS 24" o.c.

2x6 RAIL/CAP SUPPORTS SECURE TO POST W/ 2 ⅝"Ø THROUGH BOLT COUNTERSUNK FLUSH

5"x6" TIMBER DECKING - ATTACH TO BOTTOM PLATE W/ MIN (2) ¼" x 5½" LAG SCREW EA. TIMBER

4X4 WOOD RAIL POST @ EA. END OF BRIDGE AND 5'O.C. (6 TOTAL EA. SIDE)

6"x6" WOOD TIMBER SECURE TO DECKING W/ ½" Ø THROUGH BOLT 48" o.c. & TO EACH POST W/ ½" Ø THROUGH BOLT COUNTERSUNK FLUSH.

2x8 TIMBER PLATE - BOLT TO BEAM W/ ½" Ø BOLT 5'O.C. STAGGERED

WF BEAM 10X33

⅝" x 12" J BOLT

18"x18" CONCRETE FOOTING/BEAM

#4 RE-BAR - 12" O.C.

#4 RE-BAR - CONTINUOUS

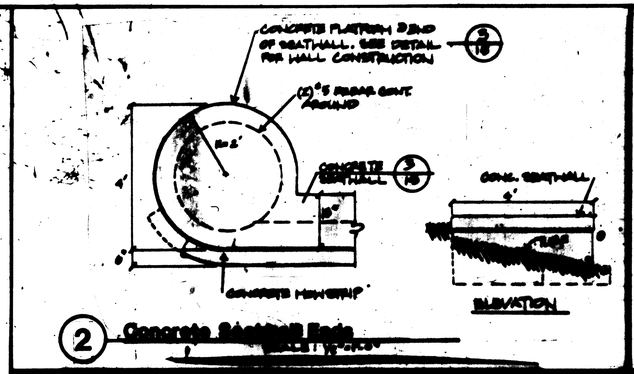
TYPE II CLASSIFIED BACKFILL - COMPACT TO 95%

NOTE!

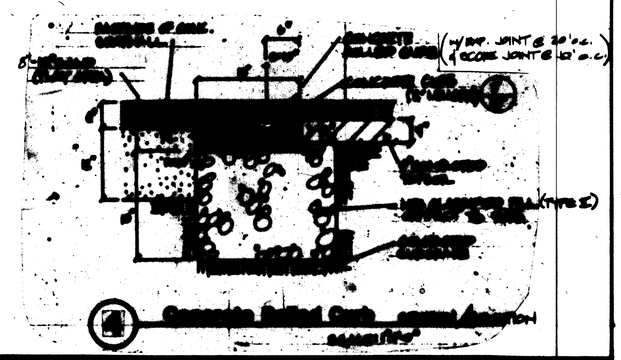
- ALL WOOD TO BE PRESSURE TREATED W/ PENTA WR OR APPROVED EQUAL - RETENTION RATE OF .6 lbs/CU.FT.
- ALL HARDWARE IN CONTACT W/ FT. TIMBER BELOW GROUND SHALL BE STAINLESS STEEL

ALL WOOD TO BE STAINED W/ 2 COATS OLYMPIC #735 - SEMI-TRANSPARENT STAIN

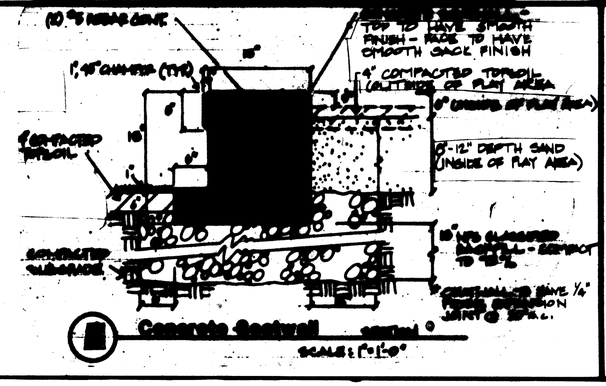
**1 Bike Trail Bridge - Creek Crossing A and B - 30' LENGTH**
Section — Scale: 3/4" = 1'-0"



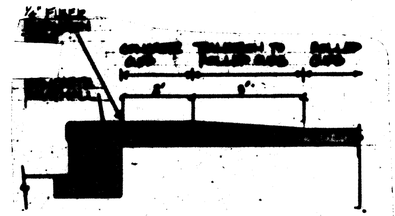

**2 Concrete Headwall Ends**



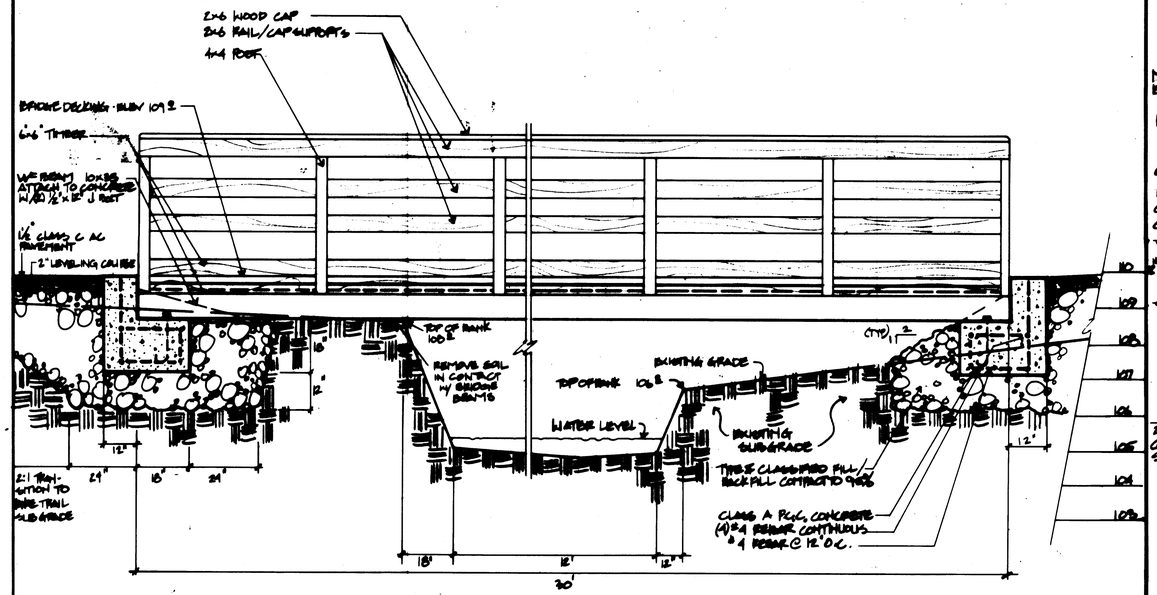

**3 Concrete Filled Curb**



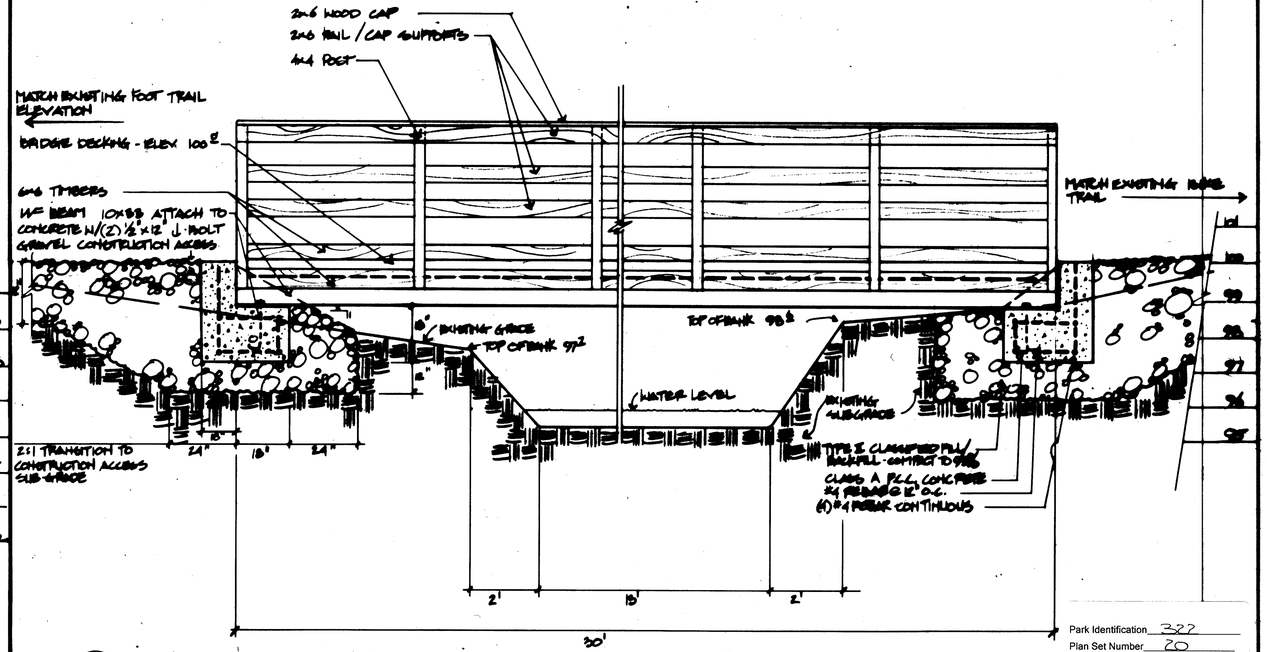

**4 Concrete Sidewalk** — SCALE: 1"=1'-0"




**5 Curb / Filled Curb Transition**
SECTION — SCALE: ½"=1'-0"




**6 Bike Trail Bridge - Creek Crossing "A"** FINISH DECK ELEVATION 109.2 — WEST ——— EAST
SCALE ½"=1'-0" T.B.M. - TOP OF REBAR 60' WEST OF BRIDGE - 109.8 — LOOKING NORTH




**7 Bike Trail - Creek Crossing "B"** FINISH DECK ELEVATION 100.2 — WEST ——— EAST
SCALE ½"=1'-0" T.B.M. - FINISH GRADE - FOOT TRAIL 20.2 WEST OF BRIDGE - 100.2 — LOOKING NORTH

Park Identification 322
Plan Set Number 20

**AS-BUILT**

| FIELD BOOKS | TRN NO. | LOCATION | ELEV. |
|---|---|---|---|
| DESIGN | | | |
| STAKING | | | |
| ASBUILT | | | |
| | | | |
| | | | |
| CONTRACTOR | BASIS OF: | | |
| INSPECTOR | | | |
| CONSTRUCTION RECORD | VERTICAL DATUM | | |

| DATA | BY | V | DATA | BY | V |
|---|---|---|---|---|---|
| BASE | | | TILE | | |
| TOPO | | | ELEC | | |
| PROFILE | | | DESIGN | | |
| SAN SEWER | | | QUANTITIES | | |
| STORM SEWER | | | ENGR. PRELIM. CHECK | | |
| WATER | | | ENGR. FINAL CHECK | | |
| GAS | | | CODED BY | | |
| PLAN CHECK | | | | | |

| REV | DATE | DESCRIPTION | BY |
|---|---|---|---|
| 1 | 1/19/87 | AS-BUILT | TSA |

REVISIONS

ENGINEERS

SEAL

PUBLIC WORKS DEPARTMENT

**Chester Creek Greenbelt Development**

**DETAILS**

SCALE AS SHOWN | DATE 3/17/87 | CODE | SHEET 15 of 16

PROJECT NO.

FILE NO.

# Appendix B – Calculations

[Page left intentionally blank]

ASSUMING ALL TIMBER USED TO CONSTRUCT BRIDGE IS HEM-FIR

2×6 (8) 30' LONG

2×8 (4) 30' LONG

6×6 (4) 30' LONG

4×4 (14) 100.5" LONG

3×8 (48) 9-3/8 LONG

COMPACT SNOW DEPTH @ TIME OF INSPECTION 12"

ANCHORAGE GROUND SNOW LOAD (ASCE CHAPTER 7, TABLE 7-1) 50 psf

SNOW LOAD ON DECK

ASCE CHAPTER 7

$P_s = 0.7 \cdot C_e \cdot C_t \cdot I_s \cdot p_g \Rightarrow P_s = 0.7(1.0)(1.2)(1.0)(50\ psf) \Rightarrow$

$C_e$ => TERRAIN CATAGORY B => PARTIALLY EXPOSED => 1.0

$C_t$ => UNHEATED AND OPEN AIR STRUCTURE => 1.2

$I_s$ => RISK CATAGORY II => 1.0

$p_g$ = 50 psf

$P_s$ = 42 psf => $P_g > 20$ psf ; $P_s \geq 20\ I_s = P_s = 20$ psf OK

USE $P_s = 42$ psf

TOTAL WIDTH OF BRIDGE INCLUDING RAILING

$(2)(7.25\ in \cdot \frac{1}{12}\frac{ft}{in}) + 9.0825\ ft \Rightarrow W = 10.84\ ft$

SNOW LOAD PER GIRDER

AASHTO 2002 BRIDGE SPEC STRENGTH I 1.75

$(10.84\ ft)/2 \cdot 42\ lb/ft^2 \Rightarrow S = 215\ lb/ft \cdot 1.75 \Rightarrow 376.25\ lb/ft$

2 = 2 GIRDERS

DEAD LOAD

HEM-FIR SG = 0.36 => $\rho = SG \cdot \rho_w \Rightarrow \rho = 0.36 \cdot 62.424\ pcf \Rightarrow$

$\rho_w$ @ 39°F = 62.424 pcf

$\Rightarrow \rho_{HEM\text{-}FIR} = 22.47\ pcf$

DEAD LOAD CONTINUED

2×6 (8) 30' LONG $\Rightarrow 1.5"(5.5")\left(\frac{1ft^2}{144in^2}\right)(30ft)(22.47\ pcf)(8)$

2×8 (4) 30' LONG $\Rightarrow 1.5"(7.25")\left(\frac{1ft^2}{144}\right)(30ft)(22.47\ pcf)(4)$

3×8 (48) 9'-3/8" LONG $\Rightarrow 2.5"(7.5")\left(\frac{1ft^2}{144in^2}\right)(9.03125ft)(22.47\ pcf)(48)$

4×4 (14) 60.5" LONG $\Rightarrow 3.5"(3.5")\left(\frac{1ft^2}{144in^2}\right)(60.5in\ \frac{1ft}{12in})(22.47\ pcf)(14)$

6×6 (4) 30' LONG $\Rightarrow 5.5"(5.5")\left(\frac{1ft^2}{144in^2}\right)(30ft)(22.47\ pcf)(4)$

2×6 = 309.1lb
2×8 = 204 lb
3×8 = 1268 lb
4×4 = 135 lb
6×6 = 566 lb
TOTAL = 2482 lb

} BRIDGE IS SYMMETRICAL LOAD CARRIED BETWEEN BOTH GIRDERS AND ALONG THE WHOLE LENGTH OF GIRDERS

(2482 lb) / 30ft / 2 GIRDERS = 41.37 lb/ft

W-BEAM W10×33 =>

AASHTO 2006 BRIDGE SPEC STRENGTH I 1.25 MULTIPLIER

D = 33 lb/ft + 41.37 lb/ft => D = 74.37 lb/ft · 1.25 => D = 93 lb/ft

PEDESTRIAN LOAD

ASHTO - LRFD GUIDE SPECIFICATIONS FOR THE DESIGN OF PEDESTRIAN BRIDGES 2009

$L_{PED}$ = 90 psf (UNREDUCED)

WIDTH OF DECK = 9.03125 ft

SYMMETRIC BRIDGE, ASSUMING EACH GIRDER CARRIES HALF LOAD.

AASHTO 2006 BRIDGE SPEC STRENGTH I 1.75 MULTIPLIER

$L_{PED}$ = (90 psf · 9.03125 ft) / 2 GIRDERS => $L_{PED}$ = 406 lb/ft · 1.75 =>

$L_{PED}$ 710.5 lb/ft

VEHICLE LOAD'S

H-5 DESIGN VEHICLE (AASHTO 2006 BRIDGE SPEC STR. I 1.75 FACTOR)

14' IN LENGTH BETWEEN LOADS
6' IN WIDTH BETWEEN LOADS

1 kip PER FRONT WHEEL
4 kip PER REAR WHEEL
} 10,000 lb TRUCK

ASSUME TIRE AREA OF 10" x 20" = 200 in²

1K · 1.75 = 1.75 K

4K · 1.75 = 7 K

GIRDER DEFLECTION LIMITS → ASHTO... PEDESTRIAN BRIDGES 2009

$\Delta_L = L/360$

ASSUME A TOTAL DEFLECTION OF $\Delta_T = L/240$

L = SPAN OF BRIDGE

18" OF BEARING ON EACH END OF GIRDER

ASSUMING ONLY HALF OF BEARING LENGTH CONTRIBUTES TO SPAN LENGTH FOR EACH END OF GIRDER.

$L = 30' - \left(\frac{18"}{2} + \frac{18"}{2}\right)\frac{1\,ft}{12in} \Rightarrow \underline{L = 28.5'}$

$\Delta_T = \frac{28.5\,ft \cdot 12\frac{in}{ft}}{240} \Rightarrow \Delta_T = 1.4\,in$

$\Delta_L = \frac{28.5\,ft \cdot 12\frac{in}{ft}}{360} \Rightarrow \Delta_L = 0.95\,in$

# DECKING PLANK ANALYSIS (SIMPLE BEAM ANALYSIS)

## LOADING

RAILING AND 6x6 POST APPLIED TO ENDS OF DECKING

6x6 => 566 lb / 2 / 30' = 9.43 lb/ft
4x4 => 135 lb / 2 / 30' = 2.25 lb/ft
3x8 => (1 PLANK)(7.5 in · .25 in · $\frac{1\ ft^3}{144\ in^3}$)(22.47 pcf) = 2.93 lb/ft
2x8 => 204 lb / 4 / 30' = 1.7 lb/ft
2x6 => 309 lb / 2 / 30' = 5.15 lb/ft

PLANK END POINT LOADS AASHTO 2006 BRIDGE SPEC 1.25 MULTI.

(9.43 plf + 2.25 plf + plf + 5.15 plf)($\frac{1\ ft}{12\ in}$)(7.5 in) · 1.25 => 14.51 lb

SELF WEIGHT AASHTO STR I 1.25

2.93 lb/ft · 1.25 => 3.75 lb/ft ≈ 4

PEDESTRIAN LOADING (90 psf UNREDUCED) & SNOW LOADING AASHTO STR I 1.75

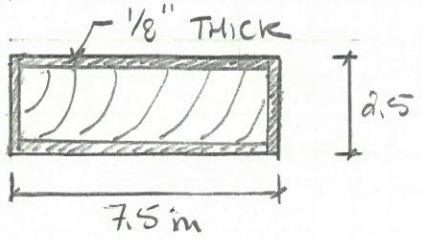
90 psf · (7.5 in · $\frac{1\ ft}{12\ in}$) => 56.25 lb/ft
42 psf · (7.5 in · $\frac{1\ ft}{12\ in}$) => 26.25 lb/ft
} 1.75 => 144 lb/ft

VEHICLE LOADING (AASHTO CONTACT AREA OF 10" x 20")
FRONT TIRES 1k REAR 4k

TIRE CONTACT AREA ENGAGES AT LEAST 3 PLANKS

## PLANK PROPERTIES

- NO DESTRUCTIVE TESTING DONE FOR DECAY OF WOOD
- ASSUMING 1/8" SURFACE DECAY ON ALL SURFACES OF LUMBER




- ASSUMING DECAYED AREA HAS NO STRUCTURAL STRENGTH

7.5" - 2(0.125) => 7.25 in w
2.50" - 2(0.125) => 2.25 in b

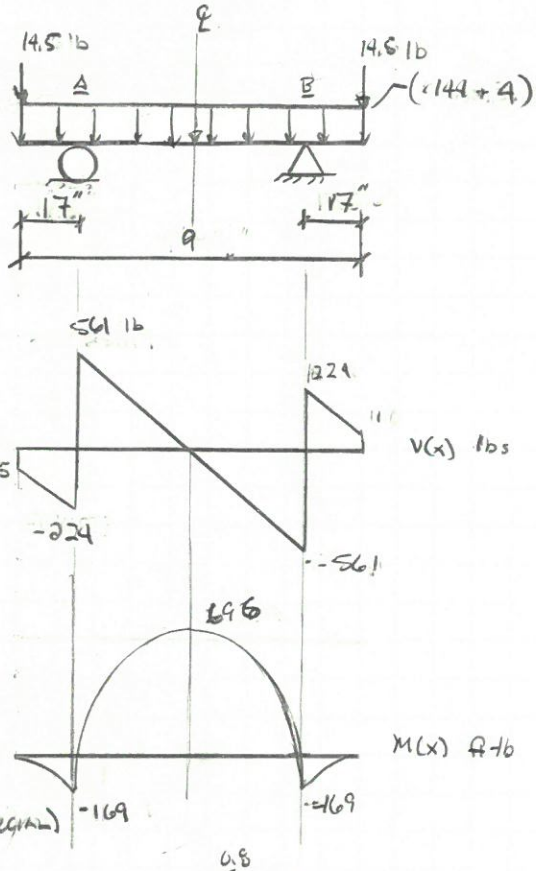
AREA = 16.3125 $in^2$
$S_y$ = $\frac{bd^2}{6}$ => [7.25 · (2.25 in)$^2$] / 6 => 6.12 $in^3$
$I_y$ = $bd^3/12$ => [7.25 · (2.25 in)$^3$] / 12 => 6.88 $in^4$

# DECKING PLANK ANALYSIS CONTINUED

## PLANK ANALYSIS

### PEDESTRIAN LOADING W/ SNOW

PLANK AND LOADING SYMMETRICAL




$$R_A = R_B = (133.2\ lb + (2)(14.5\ lb))/2$$

$$R_A = R_B = 680.5\ lb$$

PLANK STRESSES

$$f_b = \frac{M}{S} \Rightarrow \frac{696\ ft\text{-}lb \cdot 12\ \frac{in}{ft}}{6.12\ in^3}$$

$$f_b = 1366.6\ psi$$

$$f_v = \frac{3V}{2A} \Rightarrow \frac{3(561\ lb)}{2(16.32\ in^2)} \Rightarrow$$

$$f_v = 51.56\ psi$$

$$f_{c\perp} = \frac{R}{A} = \frac{680.5\ lb}{(7.25\ in \cdot 8\ in)}$$

∠ FROM W-BEAM bf

$$f_{c\perp} = 11.7\ psi$$

PLANK CAPACITIES (HEM-FIR COMMERCIAL)

$$F_{bn}' = \overset{0.85}{C_m} \cdot \overset{1}{C_t} \cdot \overset{1}{C_L} \cdot \overset{1.04}{C_f} \cdot C_{fu} \cdot \overset{0.8}{C_i} \cdot \overset{1}{C_r} \cdot 2.54 \cdot 0.85 \cdot \overset{0.8}{d^2} \cdot 1350\ psi$$

$C_m \Rightarrow F_b \cdot C_f = 1,150\ psi \cdot 1.04 = 1196\ psi > 1,150\ psi \Rightarrow C_m = 0.85$
$C_t = 1.0$
$C_L \Rightarrow$ NDS FOR WOOD CONSTRUCTION 3.3.3.1 $\Rightarrow C_L = 1.0$
$C_f = 1.04$
$C_{fu} \Rightarrow$ TABLE 4E NDS
$C_i = 0.8$
$C_r =$ INCLUDED $F_b$ TABLE 4E NDS
$d = 0.8$
$F_b = 1350\ psi \Rightarrow$ TABLE 4E NDS $(F_b)(C_R)$

$F_{bn}' = 1649\ psi > f_b = 1366.6\ psi$ OK

# DECKING PLANK ANALYSIS CONTINUED

## PLANK ANALYSIS CONTINUED

### PLANK CAPACITIES CONTINUED

$$F_{vn}' = \overset{0.97}{C_m} \cdot \overset{1}{C_t} \cdot \overset{0.8}{C_i} \cdot 2.88 \cdot 0.75 \cdot 0.8 \cdot 150\ psi$$

$C_m = 0.97$
$C_t = 1.0$
$C_i = 0.8$
$F_v = 150\ psi$

$F_{vn}' = 201.1\ psi > f_v = 51.6\ psi$ OK

$$F_{c\perp n}' = \overset{0.85}{C_m} \cdot \overset{1}{C_t} \cdot \overset{0.8}{C_i} \cdot \overset{1.0}{C_b} \cdot 1.67 \cdot 0.9 \cdot 405\ psi$$

$C_m = 0.85$
$C_t = 1.0$
$C_i = 0.8$
$C_b = 1.0$
$F_{c\perp} = 405\ psi$

$F_{c\perp n}' = 413.9\ psi > f_{c\perp} = 11.7\ psi$ OK

### PLANK LOADING SUMMARY (PEDESTRIAN AND SNOW)

$F_{bn}' = 1647.9\ psi > f_b = 1364.6\ psi$
$F_{vn}' = 201.1\ psi > f_v = 51.6\ psi$
$F_{c\perp n}' = 413.9\ psi > f_{c\perp} = 11.7\ psi$

=> PEDESTRIAN BRIDGE LOAD CAPACITY ADEQUATE FOR NORMAL PEDESTRIAN TRAFFIC

# DECKING PLANK ANALYSIS CONTINUED

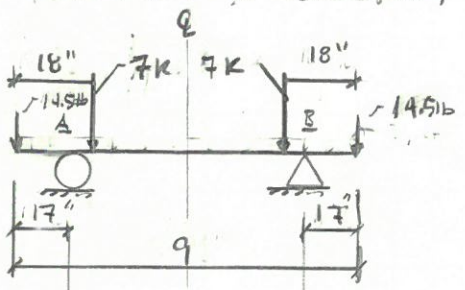
## PLANK ANALYSIS CONTINUED

### VEHICLE LOADING - RL (NEGLECTING SELF WEIGHT OF 3 PCF)

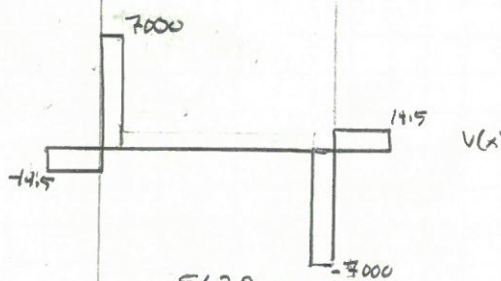
PLANK AND LOADING SYMMETRIC

$R_A = R_B = (2(7000\text{lb}) + 2(14.5\text{lb}))/2$

$R_A = R_B = 7014.5\text{lb}$



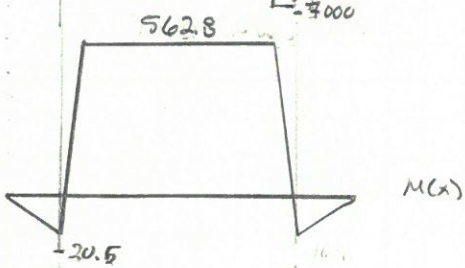

TIRE CONTACT AREA 10" x 20"
7.5" PER PLANK
ENGAGES AT LEAST 3 PLANKS




ULTIMATE LOAD SUMMARY

$M_U = 562.8\text{ ft-lb} \cdot 12\frac{\text{in}}{\text{ft}} \Rightarrow$

$M_U = 6753.6\text{ in-lb}$




$V_U = 7000\text{lb}$

PLANK LOAD CAPACITY:

3 PLANK ENGAGED

$\phi M_n = F'_{bn} \cdot S \Rightarrow \phi M_n = 1649\text{ psi} \cdot 6.12\text{ in}^3 = \phi M_n = 10092\text{ in-lb}$ PER PLANK

$F'_{bn} = 1649\text{ psi}$
$S = 6.12\text{ in}^3$

$\phi V_n = \frac{2}{3} F'_{vn} A \Rightarrow \frac{2}{3}(201\text{ psi})(16.32\text{ in}^2) \Rightarrow \phi V_n = 2187\text{lb}$ PER PLANK

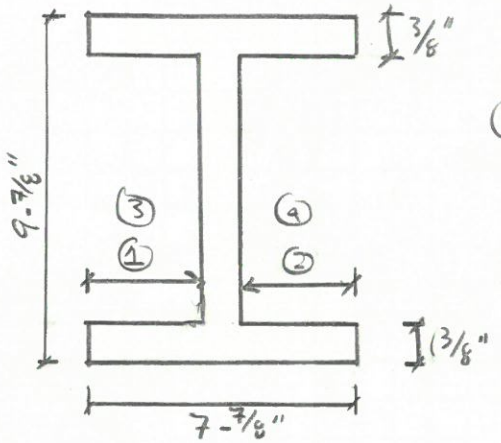
$F'_{vn} = 201\text{ psi}$
$A = 16.32\text{ in}^2$

$\phi M_n = 10109\text{ k-in} \cdot 3 \Rightarrow \phi M_n = 30.3\text{ in-k} > 6.75\text{ k in}$ OK
$\phi V_n = 2.187\text{ k} \cdot 3 \Rightarrow \phi V_n = 6.56\text{ k} < 7\text{ k}$ NOT OK

PLANKS MAY FAIL IN SHEAR PARALLEL TO GRAIN

# W-BEAM

PROJECT PLANS SPECIFIED A W10x33
DIMENSIONS MAY CONCLUDE THAT ANOTHER W-BEAM WAS USED




① = (3.875 + 3.625 + 3.75) / 3 => 3.75 in

② = (3.625 + 3.625 + 3.75) / 3 => 3.$\overline{66}$ in

③ = 3.875 in AVERAGE OF FIRST MEASUREMENTS

④ = 3.875 in AVERAGE OF FIRST MEASUREMENTS

$t_w = 7.875 - \left(\frac{3.75 + 3.875}{2}\right) - \left(\frac{3.\overline{66} + 3.875}{2}\right)$ =>

$t_w = 0.292$

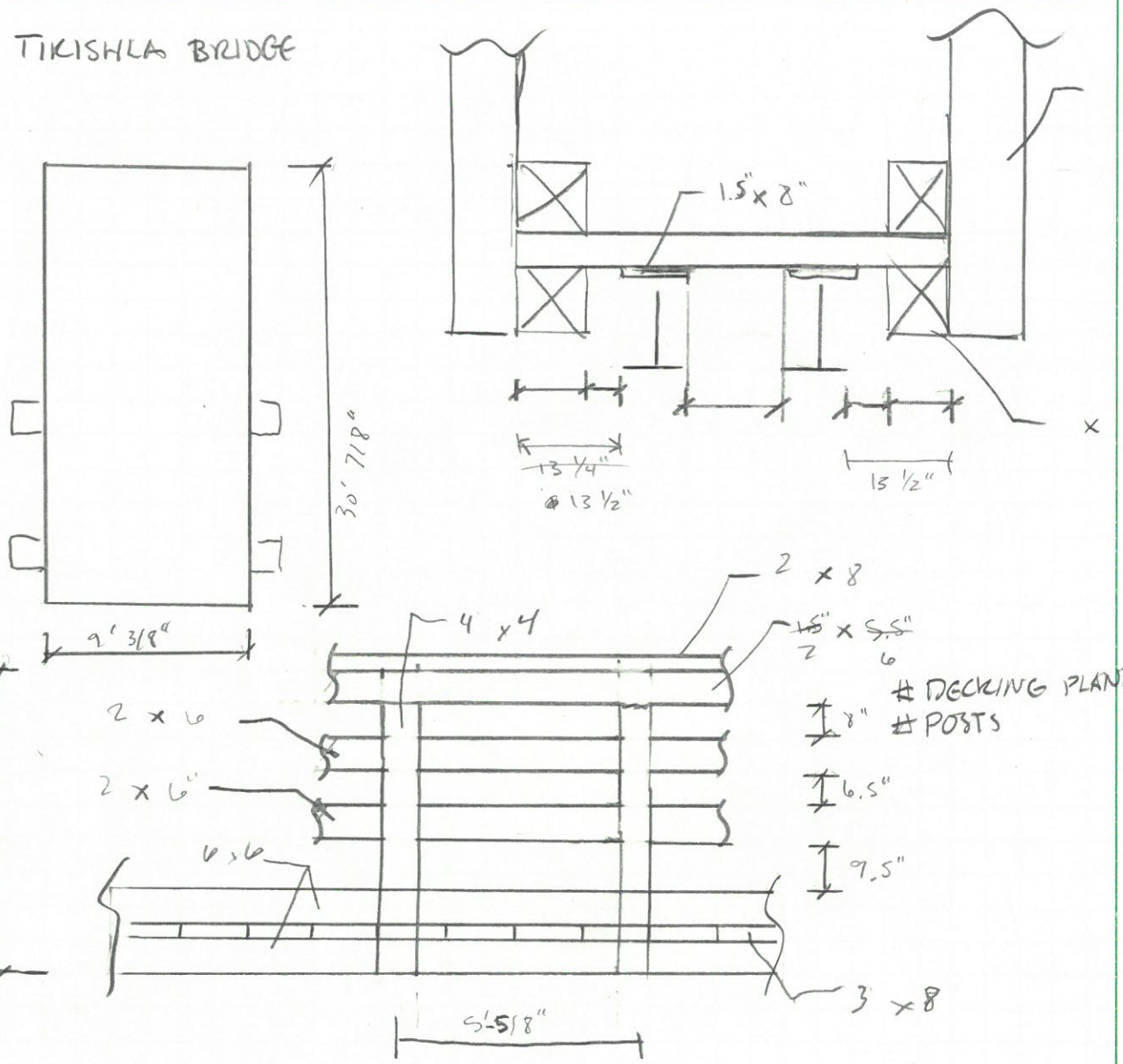
| | AISC STEEL CONSTRUCTION MANUAL | FIELD MEASUREMENTS | |
|---|---|---|---|
| d | 9.73 in | 9.875 in | ≅ ROUGHLY EQUAL +1.5% DIF. |
| $b_f$ | 7.96 in | 7.875 in | ≅ ROUGHLY EQUAL -1.1% DIF. |
| $t_f$ | 0.435 in | 0.375 in | ≠ 13.8 % DIF POSSIBLE SECTION |
| $t_w$ | 0.290 in | 0.292 in | ≅ ROUGHLY EQUAL +0.6% DIF. |

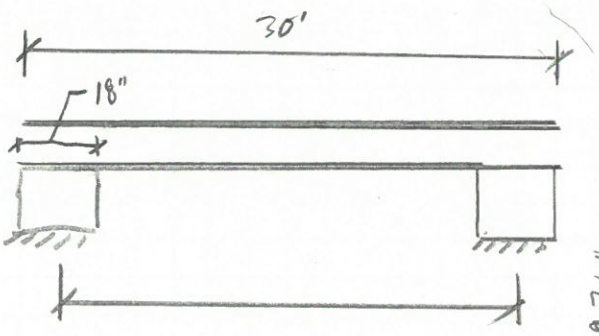
DUE TO HOW SIMILAR THE FIELD AND AVERAGE DIMENSIONS OF THE STEEL CONSTRUCTION MANUAL, THE BEAM USED IN THE ANALYSIS WILL BE IN LIKE NEW NEW CONDITION.

W-BEAM ANALYSIS WAS DONE IN RISA 3D

W-BEAM ASSUMPTIONS

# TIKISHLA BRIDGE

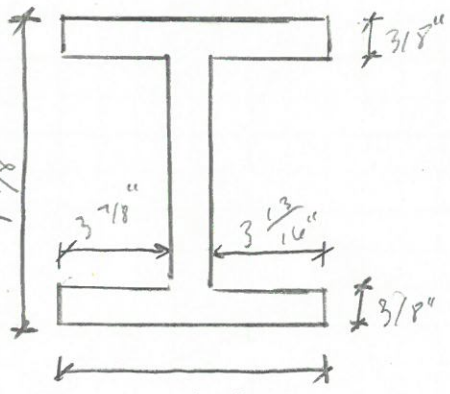



depth of footing for steel beam = 18"

Snow depth = 6" above 6x6 beam

1ST SITE VISIT




significant section loss

**W10X33 Properties**

| | | |
|---|---|---|
| $d := 9.73\ in$ | $I_x := 171\ in^4$ | $h_o := 9.30\ in$ |
| $A := 9.71\ in$ | $S_x := 35.0\ in^3$ | $J := 0.583\ in^4$ |
| $t_w := 0.290\ in$ | $r_x := 4.19\ in$ | $C_w := 791\ in^6$ |
| $t_f := 0.435\ in$ | $Z_x := 38.8\ in^3$ | $E := 29000\ ksi$ |
| $b_f := 7.96\ in$ | $S_y := 9.20\ in^3$ | $l := 28.5\ ft$ |
| $b_{\_2tf} := 9.15$ | $r_y := 1.94\ in$ | $F_y := 50\ ksi$ |
| $h_{\_tw} := 27.1$ | $r_{ts} := 2.20\ in$ | |

**Factored Loads**

| | |
|---|---|
| $L_{DEAD} := 93\ plf$ | $L_{FR.AXLE} := 1.75\ kip$ |
| $L_{SNOW} := 376.25\ plf$ | $L_{BA.AXLE} := 7.0\ kip$ |
| $L_{PEDS} := 710.5\ plf$ | |

## Dead+Snow+Pedestrian

**Ultimate Moment**

$M_U := 119.756\ kip \cdot ft$ From Risa solution, max moment occurs due to Snow+Dead+Pedestrian loads over the whole bridge

**Find $\Delta_{max}$**

$w := L_{DEAD} + L_{SNOW} + L_{PEDS} = 1.18\ klf$

$\Delta_{max} := \frac{5 \cdot w \cdot l^4}{384 \cdot E \cdot I_x} = 3.531\ in$ $M_{max} := \frac{w \cdot l^2}{8} = 119.781\ kip \cdot ft$

**Check Plastic Bending**

$M_p := F_y \cdot Z_x = 161.667\ kip \cdot ft$ (Plastic Moment Capacity)

**Check Flange Local Buckling: Unstiffened Flanges (SCM F3, SCM Table B4.1b Case 10)**

$\lambda := b_{\_2tf} = 9.15$ $\lambda_p := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$ $\lambda_r := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$

$\lambda < \lambda_p = 1$ so flanges are compact and no flange local buckling occurs

## Check Lateral Torsional Buckling (SCM F2) - Assume no lateral bracing

$L_b := l = 342\ in$ Assume no lateral bracing because there is a spacer between the beam and decking. Also, at one approach, the decking is bending away from the beam, resulting in a 1 inch gap. Bolts connecting to spacer and beam are 3' O.C. Timber is weak in cross grain tension and 2x8 spacer is decayed to and unknown extent.

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 82.23\ in \qquad \text{(F2-5)}$$

$c := 1$ For double symmetric I-shapes, c=1 (F2-8a)

$$x := \frac{J \cdot c}{S_x \cdot h_o} = 0.002$$

$$L_r := 1.95 \cdot r_{ts} \cdot \frac{E}{0.7 \cdot F_y} \cdot \sqrt{x + \sqrt{x^2 + 6.76 \left(\frac{0.7 \cdot F_y}{E}\right)^2}} = 261.308\ in \qquad \text{(F2-6)}$$

$L_b > L_r = 1$ Hence, elastic

$M_A := 89.817\ kip \cdot ft$

$M_B := 119.756\ kip \cdot ft$ $M_{max} := M_B = 119.756\ kip \cdot ft$

$M_C := 89.817\ kip \cdot ft$

$$C_b := \frac{12.5 \cdot M_{max}}{2.5 \cdot M_{max} + 3 \cdot M_A + 4 \cdot M_B + 3 \cdot M_C} = 1.136 \qquad \text{(SCM F1)}$$

$$F_{cr} := \frac{C_b \cdot \pi^2 \cdot E}{\left(\frac{L_b}{r_{ts}}\right)^2} \cdot \sqrt{1 + 0.078 \cdot x \cdot \left(\frac{L_b}{r_{ts}}\right)^2} = 28.155\ ksi \qquad \text{(F2-4)}$$

$M_n := F_{cr} \cdot S_x = 82.118\ kip \cdot ft$ $M_n \le M_p = 1$ (F2-3)

$\phi := 0.9$

$M_{n\phi} := \phi \cdot M_n = 73.906\ kip \cdot ft$ $M_{n\phi} > M_U = 0$

**Check Shear Capacity (SCM G-2)**

$V_u := \frac{w \cdot l}{2} = 16.811$ ***kip***

$h_{\_tw} = 27.1$ $h_{\_tw} \le 2.24 \cdot \sqrt{\frac{E}{F_y}} = 1$ $\phi_v := 1.00$ $C_v := 1.0$ (G2-2)

$A_w := t_w \cdot d = 2.822$ ***in***$^2$

$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 84.65$ ***kip***

$\phi V_n := \phi \cdot V_n = 76.186$ ***kip***

$\phi V_n > V_u = 1$

**Check Deflection**

$\Delta_{RISA} := 4.413$ ***in*** $\Delta_T := \frac{l}{240} = 1.425$ ***in***

$\Delta_{max} < \Delta_T = 0$ $\Delta_{RISA} < \Delta_T = 0$ Under these loading conditions, the beam will deflect more than is allowed

**Solution Summary**

The W10X33s fail in bending under the Dead+Snow+Pedestrian loads. They would not fail in shear, but would deflect more 3 inches more than is allowed.

**W10X33 Properties**

| | | |
|---|---|---|
| $d := 9.73\ in$ | $I_x := 171\ in^4$ | $h_o := 9.30\ in$ |
| $A := 9.71\ in$ | $S_x := 35.0\ in^3$ | $J := 0.583\ in^4$ |
| $t_w := 0.290\ in$ | $r_x := 4.19\ in$ | $C_w := 791\ in^6$ |
| $t_f := 0.435\ in$ | $Z_x := 38.8\ in^3$ | $E := 29000\ ksi$ |
| $b_f := 7.96\ in$ | $S_y := 9.20\ in^3$ | $l := 28.5\ ft$ |
| $b_{\_2tf} := 9.15$ | $r_y := 1.94\ in$ | $F_y := 50\ ksi$ |
| $h_{\_tw} := 27.1$ | $r_{ts} := 2.20\ in$ | |

**Factored Loads**

| | |
|---|---|
| $L_{DEAD} := 93\ plf$ | $L_{FR.AXLE} := 1.75\ kip$ |
| $L_{SNOW} := 376.25\ plf$ | $L_{BA.AXLE} := 7.0\ kip$ |
| $L_{PEDS} := 710.5\ plf$ | |

# Dead+Vehicle

**Ultimate Moment**

$M_U := 59.872\ kip \cdot ft$ From Risa Solution, max moment for the Dead+Vehicle loads

**Find** $\Delta_{max}$

$\Delta_{max} := 1.86\ in$

**Check Plastic Bending**

$M_p := F_y \cdot Z_x = 161.667\ kip \cdot ft$ (Plastic Moment Capacity)

**Check Flange Local Buckling: Unstiffened Flanges (SCM F3, SCM Table B4.1b Case 10)**

$\lambda := b_{\_2tf} = 9.15$ $\lambda_p := 0.38 \cdot \sqrt{\frac{E}{F_y}} = 9.152$ $\lambda_r := 1.0 \cdot \sqrt{\frac{E}{F_y}} = 24.083$

$\lambda < \lambda_p = 1$ so flanges are compact and no flange local buckling occurs

## Check Lateral Torsional Buckling (SCM F2) - Assume no lateral bracing

$L_b := l = 342\ in$ Assume no lateral bracing because there is a spacer between the beam and decking. Also, at one approach, the decking is bending away from the beam, resulting in a 1 inch gap. Bolts connecting to spacer and beam are 3' O.C. Timber is weak in cross grain tension and 2x8 spacer is decayed to and unknown extent.

$$L_p := 1.76 \cdot r_y \cdot \sqrt{\frac{E}{F_y}} = 82.23\ in \qquad \text{(F2-5)}$$

$c := 1$ For double symmetric I-shapes, c=1 (F2-8a)

$$x := \frac{J \cdot c}{S_x \cdot h_o} = 0.002$$

$$L_r := 1.95 \cdot r_{ts} \cdot \frac{E}{0.7 \cdot F_y} \cdot \sqrt{x + \sqrt{x^2 + 6.76\left(\frac{0.7 \cdot F_y}{E}\right)^2}} = 261.308\ in \qquad \text{(F2-6)}$$

$L_b > L_r = 1$ Hence, elastic

$M_A := 47.113\ kip \cdot ft$

$M_B := 58.88\ kip \cdot ft$ $M_{max} := M_B = 58.88\ kip \cdot ft$

$M_C := 47.113\ kip \cdot ft$

$$C_b := \frac{12.5 \cdot M_{max}}{2.5 \cdot M_{max} + 3 \cdot M_A + 4 \cdot M_B + 3 \cdot M_C} = 1.106 \qquad \text{(SCM F1)}$$

$$F_{cr} := \frac{C_b \cdot \pi^2 \cdot E}{\left(\frac{L_b}{r_{ts}}\right)^2} \cdot \sqrt{1 + 0.078 \cdot x \cdot \left(\frac{L_b}{r_{ts}}\right)^2} = 27.405\ ksi \qquad \text{(F2-4)}$$

$M_n := F_{cr} \cdot S_x = 79.932\ kip \cdot ft$ $M_n \le M_p = 1$ (F2-3)

$\phi := 0.9$

$M_{n\phi} := \phi \cdot M_n = 71.939\ kip \cdot ft$ $M_{n\phi} > M_U = 1$

## Check Shear Capacity (SCM G-2)

$V_u := 8.909\ \textit{kip}$

$h_{\_tw} = 27.1$ $\quad h_{\_tw} \le 2.24 \cdot \sqrt{\frac{E}{F_y}} = 1$ $\quad \phi_v := 1.00$ $\quad C_v := 1.0$ $\quad$ (G2-2)

$A_w := t_w \cdot d = 2.822\ \textit{in}^2$

$V_n := 0.6 \cdot F_y \cdot A_w \cdot C_v = 84.65\ \textit{kip}$

$\phi V_n := \phi \cdot V_n = 76.186\ \textit{kip}$

$\phi V_n > V_u = 1$

## Check Deflection

$\Delta_{RISA} := 1.86\ \textit{in}$ $\quad \Delta_T := \frac{l}{240} = 1.425\ \textit{in}$

$\Delta_{max} < \Delta_T = 0$ $\quad \Delta_{RISA} < \Delta_T = 0$ $\quad$ Under these loading conditions, the beam will deflect more than is allowed

## Solution Summary

The girders do not fail under Dead + Live loads. However, they would deflect 0.44 inches more than is allowed.

# Appendix C – Pedestrian Bridge Inspection Report

[Page left intentionally blank]

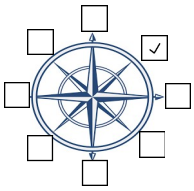
MUNICIPALITY OF ANCHORAGE PARKS AND RECREATION

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

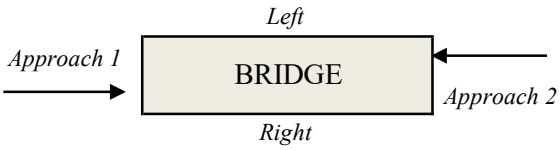
## 1. General Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| REPORT NUMBER | 3 | WEATHER | Overcast | TEMP | 30 | DATE | 2/18/17 |
| STRUCTURE NAME | Tikishla Park Bridge North | | | | | | |
| TRAIL NAME | Chester Creek Trail | | | | | | |
| PARK NAME | Tikishla Park | | | | | | |
| INSPECTOR 1 *(Name)* | Samantha Caldwell | | | | | | |
| INSPECTOR 2 *(Name)* | Shelley Giraldo | | | | | | |
| FEATURE CROSSED | Chester Creek | | | | | | |

BRIDGE TYPE
- ☐ A
- ☐ B
- ☐ C Culvert
- ☐ D Truss



*North Direction (check one)*




| | |
|---|---|
| TYPE OF UTILITIES | |

## 4. Bridge Approach

### Approach 1

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summber photo (2012). |
| SIGHT DISTANCE | 100 ft |
| SIGHT DISTANCE OBSTRUCTION | Beyond 100ft tress and brush obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 0.5 in Ice prevented measurement. Estimated. |

### Approach 2

| | |
|---|---|
| SURFACE MATERIAL | Asphalt - Pavement |
| SURFACE CONDITION | 1 - Minor |
| SURFACE DESCRIPTION | Could not assess during inspection, condition based on provided summber photo (2012). |
| SIGHT DISTANCE | 50 ft |
| SIGHT DISTANCE OBSTRUCTION | Trees, in the summer may, obstruct sight distance. |
| ELEVATION CHANGE AT APPROACH/DECK INTERFACE | 1.5 in Ice prevented measurement. Estimated. |

## 5. Existing Signage

| Type | # of Signs | Location | Condition | Up to Date | Signage Statement | Comments |
|---|---|---|---|---|---|---|
| Other Sign | 4 | Both Approaches | Missing | No | None | Reflectors, (3) Missing. |
| | | | | | | |
| | | | | | | |

***Surface Material:*** *AC - Pavement, Concrete Slab, Dirt, Gravel;* ***Surface Condition:*** *0-Smooth, 1-Minor, 2-Rough, 3-Pothole, 4-Severe, 5-Other;* ***Type (Signage):*** *Reflector, Object Marker, Load Limit, Name Place;* ***Location (Signage):*** *Approach 1 - Left, Approach 1 - Right, Approach 2 - Left, Approach 2 - Right:* ***Condition (Signage):*** *New, Good, Missing, Damaged, Painted, Other*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 6. Bridge Superstructure (Bridge Types A, B, D)

### Railing

| | | |
|---|---|---|
| RAILING HEIGHT | 4 ft | |
| TOE PLATE IS PRESENT | Yes | |
| RAILING COMPLIES W/ IBC DESIGN CRITERIA | No | |
| IF NO, DESCRIBE NONCOMPLIANCE(S) | Spacing between railing is 9.5". | |

### Truss (Bridge Type D only)

| | | |
|---|---|---|
| TRUSS HEIGHT | ft | |
| VERTICAL CLEARANCE | ft | |

### Decking

| | | |
|---|---|---|
| DECK OVERLAY MATERIAL | None | |
| DECK OVERLAY THICKNESS | in | |
| DECK MATERIAL | Timber | |
| DECK THICKNESS | 3 in | |
| EXPANSION JOINT GAP | 1.5 in | Ice prevented measurement. Estimated. |

### Superstructure Conditions

| Material | Category | Condition | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| T | RAILING | Damaged railing at approach 1. Left railing bowed out and noticable sagging. Perserved wood has minor to moderate decay. Damaged railing posts. Some missing hardware in posts. | D<br>T | L | D<br>W | | 5 |
| | TRUSS - Check Welds, Paint and Members (Bridge Type D Only) | None | | | | | |
| T | DECK AND DECK OVERLAY | Could not assess during inspection, condition based on provided summer photo (2012). Wood frame separating from girder (1"), approach 2. Settlement has created an elevation difference at approach 2. | | | D | | 6 |
| None | EXPANSION JOINTS | Could not assess during inspection, condition based on provided summer photo (2012). No expansion joint cover, debris in expansion gap, and settlement has created a gap at interface (2012 photos). | | | | | 6 |
| | FLOOR BEAMS (TRANSVERSE) | None | | | | | |
| S | STRINGERS OR GIRDERS (LONGITUDINAL) | Extensive loss of protective paint on girders. Moderate surface rust throughout members. Minor to moderate section loss of steel. Wood frame separating from girder (1"), approach 2. | | L | C | | 6 |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Deck Overlay Material*** *- Asphalt, Fiberglass, Concrete, Synthetic, Other, None;* ***Deck Material*** *– Aluminum, Concrete, Pre-stressed Concrete, Masonry, Steel, Timber, Other;* ***Material*** *- AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

## 7. Bridge Substructure (Bridge Types A, B, D)

### Abutment Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| C | ABUTMENT | Spalling under girder. Honeycombing at back face of amutment. No bearing pad between abutment and girder. | | H | W | C<br>SP | 7 |
| D | FOUNDATION | Possible settlement at approach 2. | | | | | 5 |

### Pier Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | PIER(S) | No piers | | | | | |
| | PIER CAP | No piers | | | | | |
| | SHAFT BELOW CAP | No piers | | | | | |
| | FOUNDATION | No piers | | | | | |

### Retaining Wall Conditions

| Materials | Category | Condition Description | Deformation | Defects | Deterioration | Cracks | Ratings |
|---|---|---|---|---|---|---|---|
| | WALL | No retaining wall | | | | | |
| | FOUNDATION | No retaining wall | | | | | |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

# PEDESTRIAN BRIDGE
## ROUTINE INSPECTION REPORT

### 8. Culvert

| | |
|---|---|
| SHAPE OF CULVERT | |
| FLOW RELATIVE TO TOP OF CULVERT | in |

| Material | Item | Condition Description | Deformation | Defects | Deterioration | Cracks | Rating |
|---|---|---|---|---|---|---|---|
| | RAILS | Structure not a culvert. | | | | | |
| | SURFACE | Structure not a culvert. | | | | | |
| | CULVERT | Structure not a culvert. | | | | | |
| | PARAPETS | Structure not a culvert. | | | | | |
| | INLET APRON | Structure not a culvert. | | | | | |
| | OUTLET APRON | Structure not a culvert. | | | | | |

### 9. Hydrology

#### Flooding

| | |
|---|---|
| HAS FLOODING OCCURRED SINCE LAST INSPECTION? | No |
| DATE OF FLOODING | |
| FLOODLINE RELATIVE TO DECK | ft |

#### Waterway

| Material | Item | Condition Description | Rating |
|---|---|---|---|
| D | SLOPE | Bank erosion very close to approach 2. May be causing settlement. | 5 |

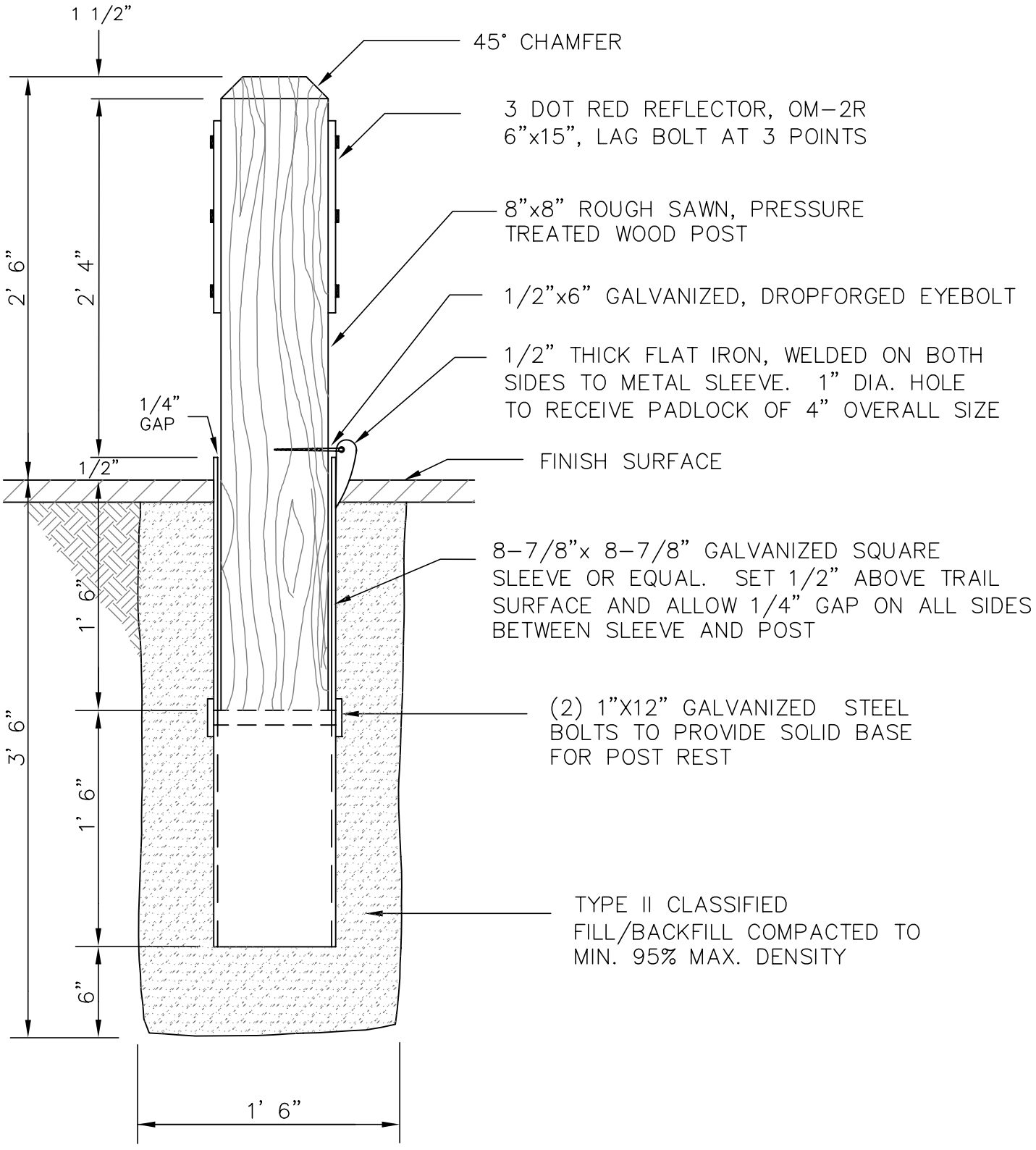
#### Scour and Erosion

| | |
|---|---|
| SCOUR/EROSION LOCATION | Approach 2, undermining bank |
| ESTIMATED DEPTH | 0.25 ft |
| ESTIMATED WIDTH | 0.5 ft |

*IBC Design Criteria – see MOA Pedestrian Bridge Inspection Guide;* ***Material*** *– AL (Aluminum), AS (Asphalt), C (Concrete), PC (Pre-stressed Concrete), D (Dirt), EL (Elastomeric), M (Masonry), NV (Natural Vegetation), O (other), R (Rock), S (Steel), T (Timber), and W (Wire);* ***Deformation*** *– B (Buckling), BN (Bent), C (Crushed), D (Permanent Deflection), R (Ruptured), S (Sheared), and T (Traffic Damage);* ***Defects*** *– G (Excessive Timber Grain Slope), H (Honeycombs in Concrete), K (Knots in Timber), and L (Loose Bolts or Rivets);* ***Deterioration*** *– C (Chemical Rust), D (Decay), I (Insect Attack), S (Seasoning of Timber – splits, checks, ect), and W (Uneven or excessive wear);* ***Rating*** *– See MOA Pedestrian Inspection Guide Section* ***X*** *Superstructure, for Rating Descriptions*

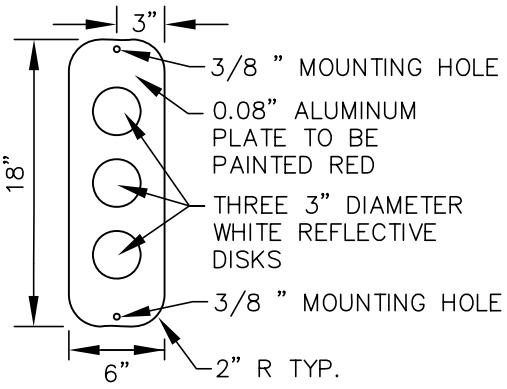
# Appendix D – Recommendations

[Page left intentionally blank]

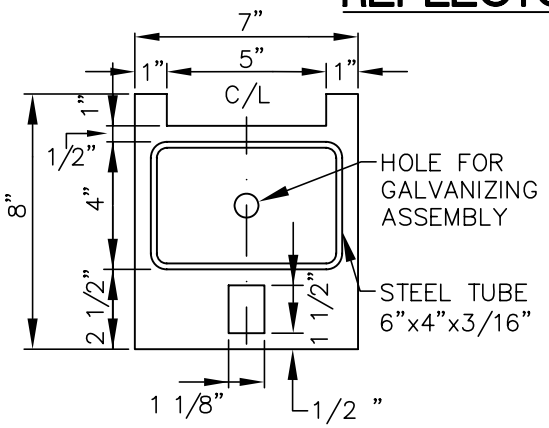



NOTES
1. LOCATE PADLOCK AWAY FROM TRAFFIC FLOW.

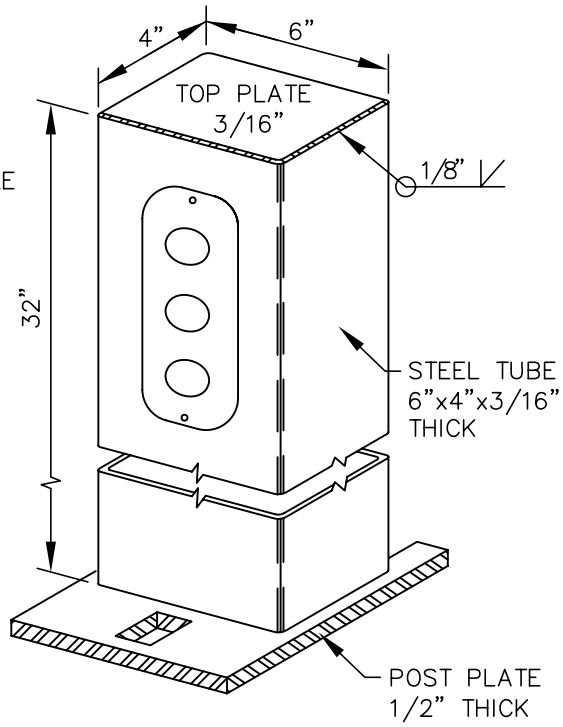
| | | | |
|---|---|---|---|
| MUNICIPALITY OF ANCHORAGE | SCALE: NTS<br>APPROVED:<br>REVISED: 10/08 | **REMOVABLE WOOD BOLLARD** | SECTION # 70.13<br>DETAIL # 70-35 |

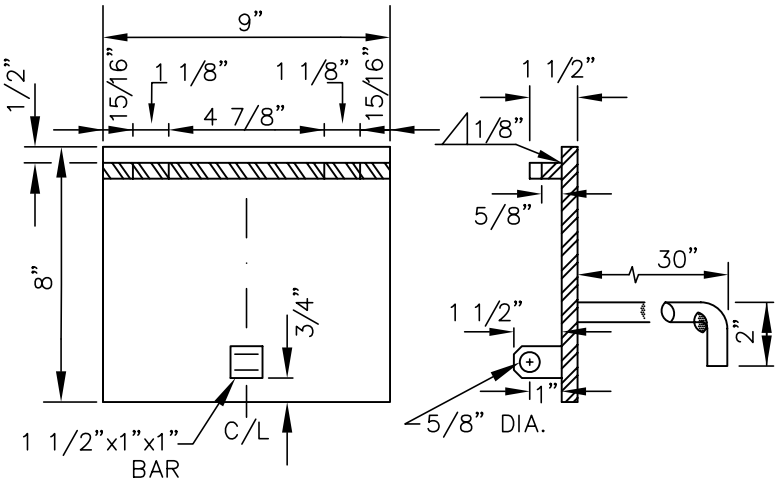



## REFLECTOR PLATE

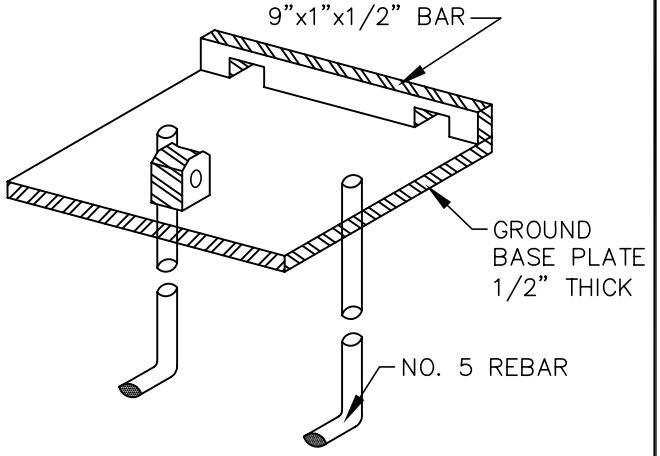



## POST BASE PLATE




## GROUND BASE PLATE

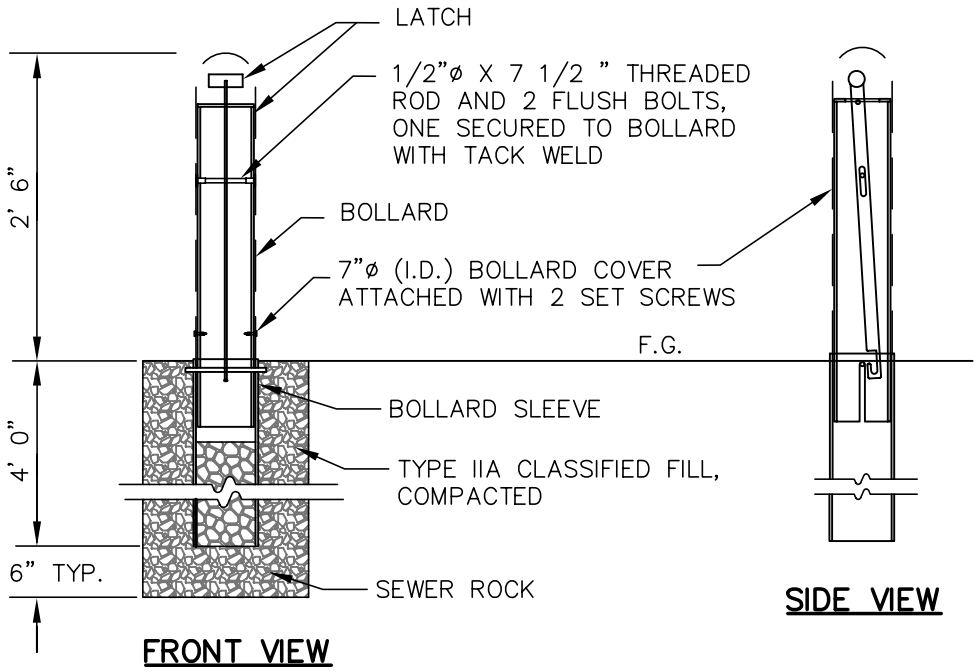



## ISOMETRIC VIEW

NOTES:

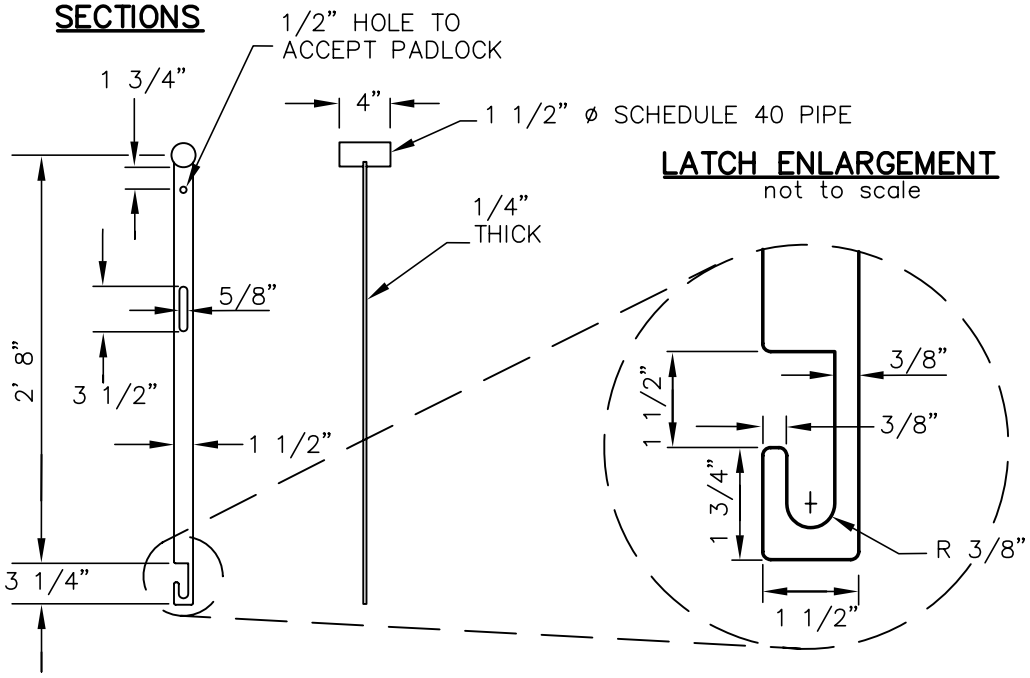
1. ALL WELDS, UNLESS OTHERWISE SHOWN, SHALL BE THREE–SIXTEENTH INCH (3/16") FILLET – ALL AROUND.
2. CAST IN PLACE WITH CLASS 'A' CONCRETE IN A TWELVE INCH DIAMETER BY THIRTY SIX INCH (12" X 36") FOUNDATION TUBE.
3. REMOVABLE BOLLARDS ARE TO HAVE ADHESIVE REFLECTORS ON BOTH FRONT AND BACK OF POST.
4. ALL EXTERIOR CORNERS AND EDGES SHALL BE ROUNDED TO PROVIDE A PROJECTION FREE SURFACE.

| MUNICIPALITY OF ANCHORAGE | SCALE: NTS<br>APPROVED:<br>REVISED: 10/08 | # REMOVABLE BOLLARD (RECTANGULAR) | SECTION # 70.13<br>DETAIL # 70–37 |
|---|---|---|---|



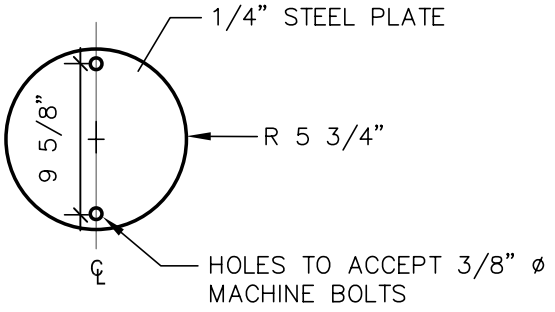

NOTE: ALL FINAL FABRICATIONS TO BE GALVANIZED PRIOR TO ASSEMBLY

# REMOVABLE BOLLARD ASSEMBLY



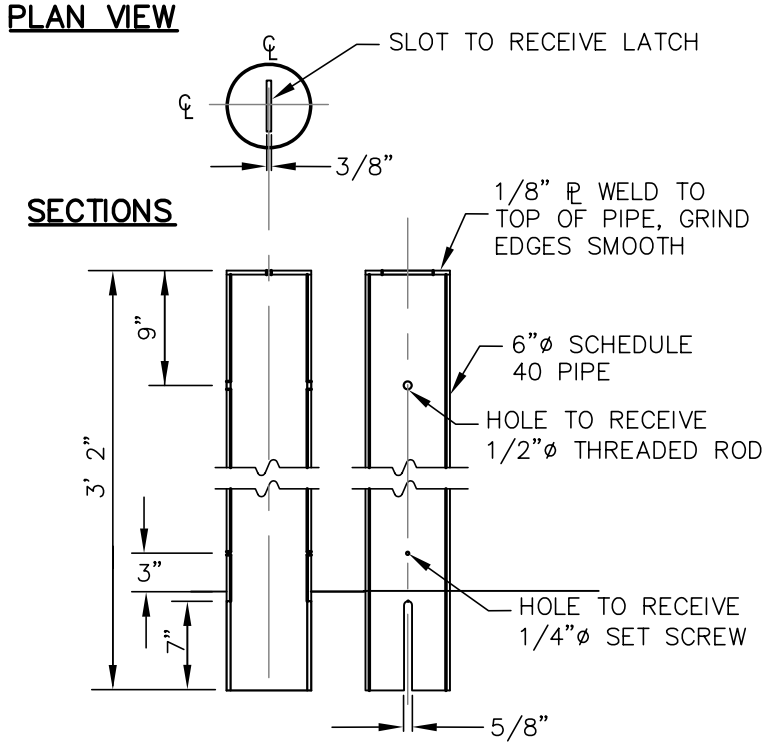

## LATCH

| | | | |
|---|---|---|---|
| MUNICIPALITY OF ANCHORAGE | SCALE: NTS<br>APPROVED:<br>REVISED: 10/08 | **REMOVABLE BOLLARD (ROUND)**<br>SHEET 1 OF 2 | SECTION # 70.10<br>DETAIL # 70–38.1 |

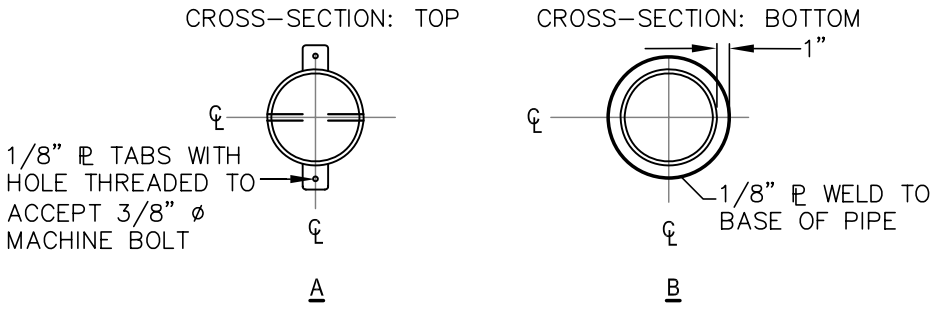


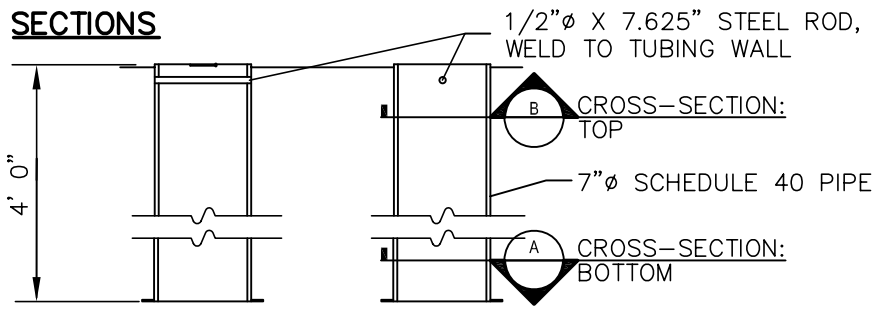

NOTE: PROVIDE 1 TEMPORARY CAP PER REMOVABLE BOLLARD TO OWNER.

## REMOVABLE BOLLARD TEMPORARY CAP




## BOLLARD




NOTE: SET SLEEVE 1/8"ABOVE ADJACENT SURFACE

## BOLLARD SLEEVE

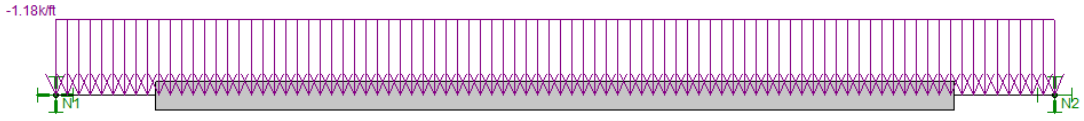
| | | | |
|---|---|---|---|
| MUNICIPALITY OF ANCHORAGE | SCALE: NTS<br>APPROVED:<br>REVISED: 10/08 | **REMOVABLE BOLLARD (ROUND)**<br>SHEET 2 OF 2 | SECTION # 70.10<br>DETAIL # 70-38.2 |

# Appendix E – Other Supporting Information

[Page left intentionally blank]

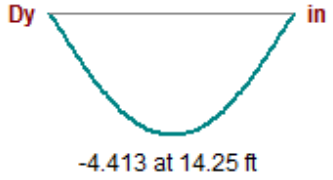
An “Unauthorized Motor Vehicles Prohibited” sign should be provided near the bridge.

Pedestrian + Snow + Dead Loads for W10x33 Girder



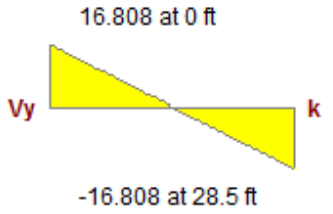

Beam: *M1*

Shape: W10x33
Material: A992
Length: 28.5 ft
I Joint: N1
J Joint: N2
LC 2: S+D+P
Code Check: No Calc
Report Based On 97 Sections




Dz — in

A — k

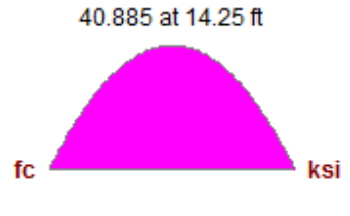


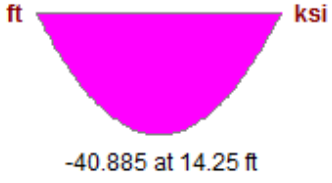

Vz — k

T — k-ft


My — k-ft

fa — ksi



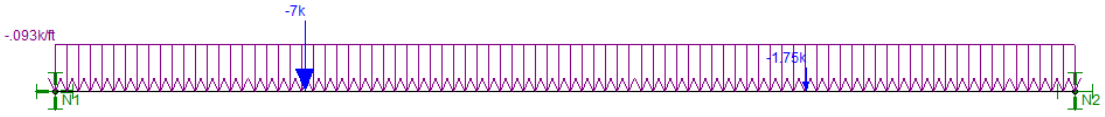




***AISC 14th(360-10): ASD Code Check***
**Direct Analysis Method**

- P-Delta analysis required for all AISC 360-10 Load Combinations -

Max Defl Ratio L/77

Vehicle + Dead Loads for W10x33 Girder (illistrated point load position not the worst case)




Beam: *M1*

Shape: W10x33
Material: A992
Length: 28.5 ft
I Joint: N1
J Joint: N2
Envelope
Code Check: No Calc
Report Based On 97 Sections

| | | |
|---|---|---|
| | Dy in<br>-1.864 at 13.953 ft | Dz in |
| A k | 8.909 at 0 ft<br>Vy k<br>-8.909 at 28.5 ft | Vz k |
| T k-ft | Mz k-ft<br>-59.872 at 15.437 ft | My k-ft |
| fa ksi | 20.44 at 15.437 ft<br>f(y) ksi<br>-20.44 at 15.437 ft | f(z) ksi |

***AISC 14th(360-10): ASD Code Check***
Direct Analysis Method

- P-Delta analysis required for all AISC 360-10 Load Combinations -

Max Defl Ratio L/183

## Appendix D – Pedestrian Bridge Inspection Guide

[Page intentionally left blank]

MUNICIPALITY OF ANCHORAGE

PARKS AND RECREATION

# MOA PROJECT B

# PEDESTRIAN BRIDGE INSPECTION GUIDE


**APRIL 2017**

# PEDESTRIAN BRIDGE INSPECTION MANUAL

Municipality of Anchorage

Parks and Recreation Department

April 2017

# FOREWARD

In order to forward the values of building community, modeling stewardship and promoting Healthy Parks and Healthy People, Anchorage Parks and Recreation has committed to annual inspection of municipality owned, multi-use pedestrian bridges.

This document serves as a manual for routine pedestrian bridge inspections. It represents the Municipality's commitment to supporting a healthy community as well as a pledge towards advancing in technology to find solutions for community problems.

JOSH DURAND, MOA PARKS SUPERINTENDENT

# 2017 ACKNOWLEDGEMENTS

The MOA Project B Bridge Inspection Survey and Guide are the result of the collective efforts of a student team completing their Civil Engineering Capstone course at the University of Alaska, Anchorage. Throughout the project, the student team collaborated with their Municipality client, Josh Durand, MOA Parks Superintendent. Dr. Andrew Metzger served as the faculty mentor for the project and guided the team through two initial bridge inspections.

The student team was comprised of four Civil Engineering student members: Shelley Giraldo, Jared Kinney, Brian Weigand, and Samantha Caldwell.

SHELLEY J. GIRALDO, COORDINATOR AND EDITOR

# TABLE OF CONTENTS

# LIST OF FIGURES

# LIST OF TABLES

# 1.0 INTRODUCTION

## 1.1 Purpose and Usage

The Municipality of Anchorage (MOA) Project B Pedestrian Bridge Inspection Guide (PBIG) accompanies the customized Survey 123 Application, which was tailored for the MOA Parks and Recreation Department as part of a senior capstone project at the University of Alaska, Anchorage. The customized application, the MOA Project B Survey, was designed for use as a routine pedestrian bridge and culvert inspection report that can be conducted annually by Municipality of Anchorage employees. While the MOA Project B Survey and this Pedestrian Bridge Inspection Guide contain engineering terminology, it is important to note that the survey and guide have been formulated for Parks and Recreation employees, who are not engineers. The descriptions within this guide explain engineering terminology and will assist in routine inspections. However, routine inspections conducted using the survey and this guide are not intended to replace full inspections and full structural analysis reports that can only be conducted by professional engineers. If a routine inspection identifies alarming bridge deficiencies, an engineer should perform an inspection in order to determine current bridge load ratings and the need for bridge signage, bollards, retrofits or replacement.

This guide provides information on how to rate the conditions of each element of a pedestrian bridge. Please note that ratings performed using this manual are not equivalent to an engineer's rating. These condition ratings can be used to assess whether or not a bridge condition warrants inspection by an engineer. Only a qualified engineer can actually rate a bridge.

This manual should not be used as a textbook or source for information on full bridge inspections. For questions or elucidation, the Federal Highway Administration Bridge Inspector's Reference Manual should be referenced.

## 1.2 Applicability

This guide accompanies the MOA Project B Survey for the Municipality of Anchorage. The guide and survey provide a methodology to perform routine pedestrian bridge and culvert inspections along Anchorage's multi-use trails. The guide and survey shall be used annually to ensure the integrity of the bridges and the safety of the community. The routine inspections shall occur during summer months so that bridge members, defects, and deficiencies are not obscured do to snow and ice cover. Since the inspection survey has been created to be compatible with GIS, inspection information will be stored on and accessible from an ESRI cloud-based geodatabase. The GIS geodatabase will thus serve as an archive and an up-to-date source of information on the location

and condition of Anchorage's pedestrian bridges and culverts. This guide and the accompanying survey can also serve as a model that could be used by other municipalities nationwide.

## 1.3 Policy and Referenced Standards, Manuals and Documents

The U.S. Department of Transportation and Federal Highway Administration (USDOT&FHWA) provides guidance for inspection of traffic bridges in the National Bridge Inspection Standards (NBIS). These standards are applicable for bridges carrying traffic or other moving loads with an opening of more than 20 feet between abutment undercopings or arch spring lines. They are also applicable to culverts over 20 feet in length. Since pedestrian bridges do not carry traffic loads and are often less than 20 feet in length, they are not governed by the NBIS standards. The pedestrian bridge inspection project thus amalgamated relevant information from the NBIS and made it applicable to pedestrian bridge inspection. For formatting, this guide heavily referenced the New York Department of Transportation 2016 Bridge Inspection Manual, which can be located on the New York DOT website. Rating descriptions presented in this guide and in the survey are adopted from the Indian Reservation Roads Program BISS2 Lookup Report and the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nations Bridges, December 1995.
All sources referenced in the creation of the survey and manual are listed below.

- American Association of Transportation and Highway Officials (AASHTO) Guide for the Planning, Design, and Operation of Pedestrian Facilities
- AASHTO LRFD Bridge Design Specifications
- Alaska Department of Transportation (AKDOT) Bridge Inspection Reports
- Bureau of Indian Affairs Indian Reservation Roads Program BISS2 Lookup Report
- Federal Highway Administration (FHWA) Bridge Inspector's Reference Manual (BIRM)
- FHWA Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges
- New York State Department of Transportation (NYSDOT) Bridge Inspection Manual
- USDOT FHWA National Bridge Inspection Standards 23 CFR 650

# 2.0 PLANNING AND PERSONNEL

## 2.1 Inspection Types and Personnel Requirements

This Pedestrian Bridge Inspection Guide is intended to assist inspectors as they perform routine pedestrian bridge inspections. However, if alarming deficiencies are found, the routine inspection should trigger a full inspection conducted by a professional engineer.

*Routine Inspection*

Routine inspection shall be required for all pedestrian bridges at a maximum interval of 12 months. The bridges should be inspected during the summer months when all members, defects and deficiencies are fully visible and not obscured by snow or ice. Routine inspections shall be conducted by Parks and Recreation employees who have read and fully understand this inspection guide.

*Full Inspection*

Full inspection shall occur if the routine inspection determines that alarming deficiencies are present. Alarming deficiencies correspond to condition ratings of 0, 1, 2 or 3. (Condition ratings are discussed in Sections 3.5.4, 3.5.5, 3.6.6 and 3.7.3). A professional engineer or engineering firm shall be hired to perform the full inspection and structural analysis of the bridge in question to determine what remediation measures are necessary. The professional engineer must possess relevant knowledge in regards to bridge anatomy and structural analysis.

## 2.2 Inspection Scheduling and Planning

In order for bridge inspections to be effective, they should be conducted during summer months. Inspection scheduling should consider the following:

1) Ensure that inspection for each bridge occurs at a maximum interval of 12 months;
2) Maximize efficient use of labor by scheduling inspection of bridges that are in close proximity of each other for one day;
3) Schedule inspections for days that have favorable weather conditions;
4) Ensure that successive inspections are not conducted by the same inspector;
5) Identify and mitigate all job hazards.

# 3.0 PEDESTRIAN BRIDGE INSPECTION

The MOA Project B Pedestrian Bridge Inspection Survey contains fields to collect all information required to complete a pedestrian bridge inspection. The survey contains the following categories:

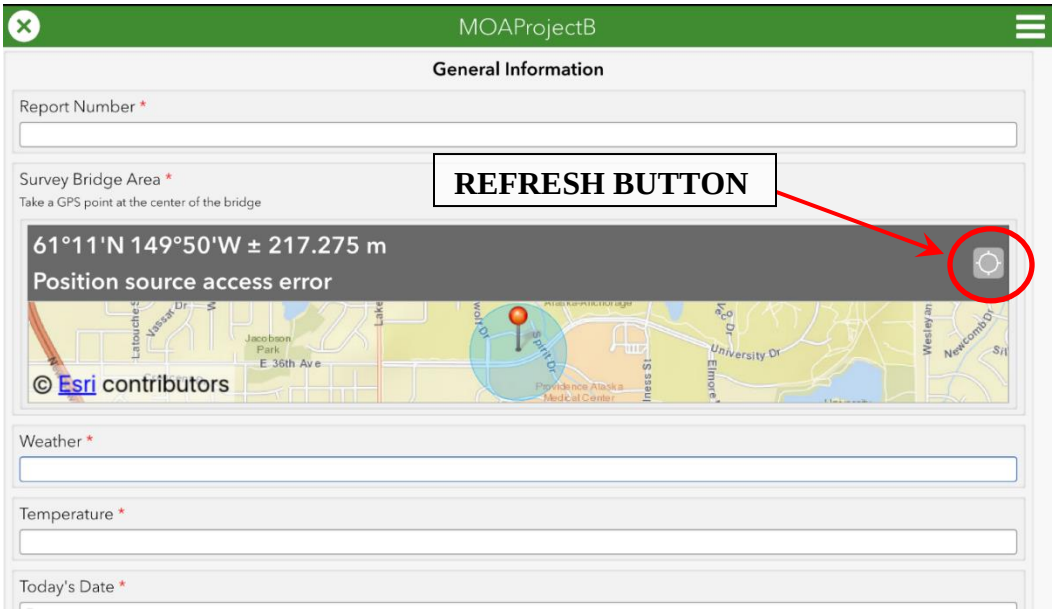
- General Information
- Bridge Approach
- Existing Bridge Signage
- Bridge Superstructure
- Bridge Substructure
- Hydrological Information

## 3.1 General Information

The General Information section contains fields to record the report number, northing and easting coordinates, weather, temperature, inspection date, bridge name, physical location (trail name and park name), inspector(s) name, and feature crossed (creek, stream, lagoon, trail, et cetera). The inspector must choose a bridge type (see Bridge Types below). Additionally, the inspector must note whether or not the bridge is a culvert and determine the presence and type of utilities located on or under the bridge.

The App will automatically take the northing and easting coordinates as soon as it is opened. If the App is opened prior to reaching the bridge, the map must be refreshed. Click the refresh symbol on the upper right hand corner of the map, as depicted in Figure 1, in order to ensure that the correct coordinates have been recorded.

*Figure 1. Refresh Button*



### *3.1.1 Bridge Types*

To aid GIS query capabilities, distinct bridge types have been divided into five alphabetically delineated categories. The five categories are described below.

***Type A.*** The most commonly occurring type of bridge is categorized as Type A and depicted in Figure 2. This type of bridge is an arched, simply supported bridge with railings that do not extend below the bridge's wooden deck. The bridge's railings, longitudinal beams and transverse beams are made of unpainted steel resting on concrete abutments.

*Figure 2. Type A Bridge*

***Type B.*** The Type B bridge is a simply supported truss bridge. The truss members double as railings and extend below the bridge's deck to help support the load. This type of bridge has truss members, longitudinal beams, and transverse beams that are made of painted or unpainted steel. The beams rest on concrete abutments and the decking material may be concrete or wood.

Type B bridges are easy to identify since trusses are usually comprised of triangular units. Additionally, if the railing system extends below the decking, it is probably a Type B Bridge, as depicted in Figure 3.

*Figure 3. Type B Bridge*

***Type C.*** Type C bridges represent culverts, as depicted in Figure 4. Culverts may have one or more culvert pipes allowing water to flow below the trail. Railing types and materials may vary.

*Figure 4. Type C Bridge*

***Type D.*** Glulam bridges are defined as Type D. These bridges are arched and have two deep glulam girders, as shown in Figure 5. Glulam stands for glued-laminated members, so if the girders are made of thin pieces of lumber glued together, it is a Type D bridge. The glulam girders may be flush with the deck or may extend above and below the deck. The wooden deck rests on transverse glulam beams, while abutments may be concrete or wood. Railing types and materials may vary.

*Figure 5. Type D Bridge*

***Type D.*** The final bridge type represents simply supported timber bridges that do not fall into any of the proceeding categories. These simply supported bridges may rest on wooden or steel girders and may have horizontal or vertical railing members as demonstrated in Figures 5 and 6.

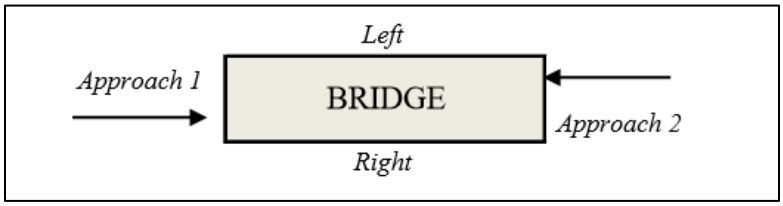
*Figure 6. Type D Bridge*

*Figure 7. Type D Bridge*

## 3.2 Bridge Approach

The inspector is responsible to observe and assess bridge approaches. An approach is the portion of the trail that leads to and connects to the bridge. Since each bridge has two ends, each bridge has two approaches (see Figure 8), which must be differentiated utilizing cardinal and intercardinal directions. The inspection survey queries, "Approach 1 is one which end of the bridge?" and offers the following dropdown options for the inspector to choose from: *North, Northeast, East, Southeast, South, Southwest, West, Northwest.* (For example, if the inspector approaches the bridge from the southeast, he should choose *Southeast.*) Bridge deficiencies can then be locationally described in terms of Approach 1 or Approach 2.

*Figure 8. Bridge Approaches*




For each approach, the following information shall be recorded:

- Surface material;
- Surface condition;
- Surface description;
- Sight distance;
- Sight distance obstruction;

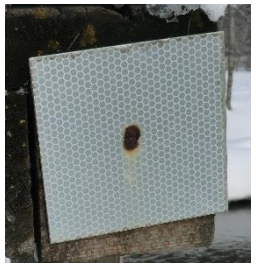
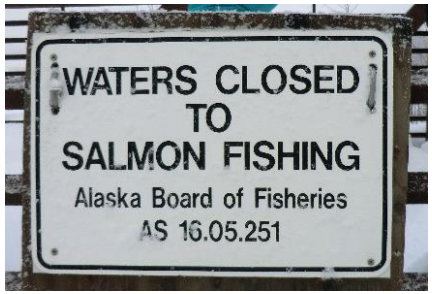
Surface material selections include *asphalt, concrete, dirt,* or *gravel.* Surface conditions can be described as *smooth, minor* (minor pitting), *rough* (moderate pitting, minor root upheaval, bumpy), *pothole, severe* (major root upheaval, extreme potholes), *other.* General descriptions of the surface should be entered into the surface description field. If the surface is not visible due to ice or snow, this should be noted.

Sight distance is the distance from one end of the bridge to any obstruction, such as a grove of trees or a curve in the trail, that would prevent a person on the bridge from being able to see a person on the trail or vice versa. Sight distance is a safety issue since a biker could easily collide with a pedestrian or another biker if sight distance is limited. Sight distance and the sight distance obstruction shall be recorded. If sight distance is greater than 100 ft., merely state "100 ft."

## 3.4 Existing Bridge Signage

The number, types, locations and conditions of existing signage on the bridge shall be recorded. Signage types include *reflectors, object markers, load limit, warning or hazard, bollards,* or *other.* Examples of signage are depicted in Table 1. The location of the signs shall also be delineated in terms of Approach 1, Approach 2, or Both Approaches. The condition of the signs shall be qualified as *new, good, missing, damaged, painted* or *other*. If the signs contain words, the signage statement shall be recorded. All signage should be photographically recorded.

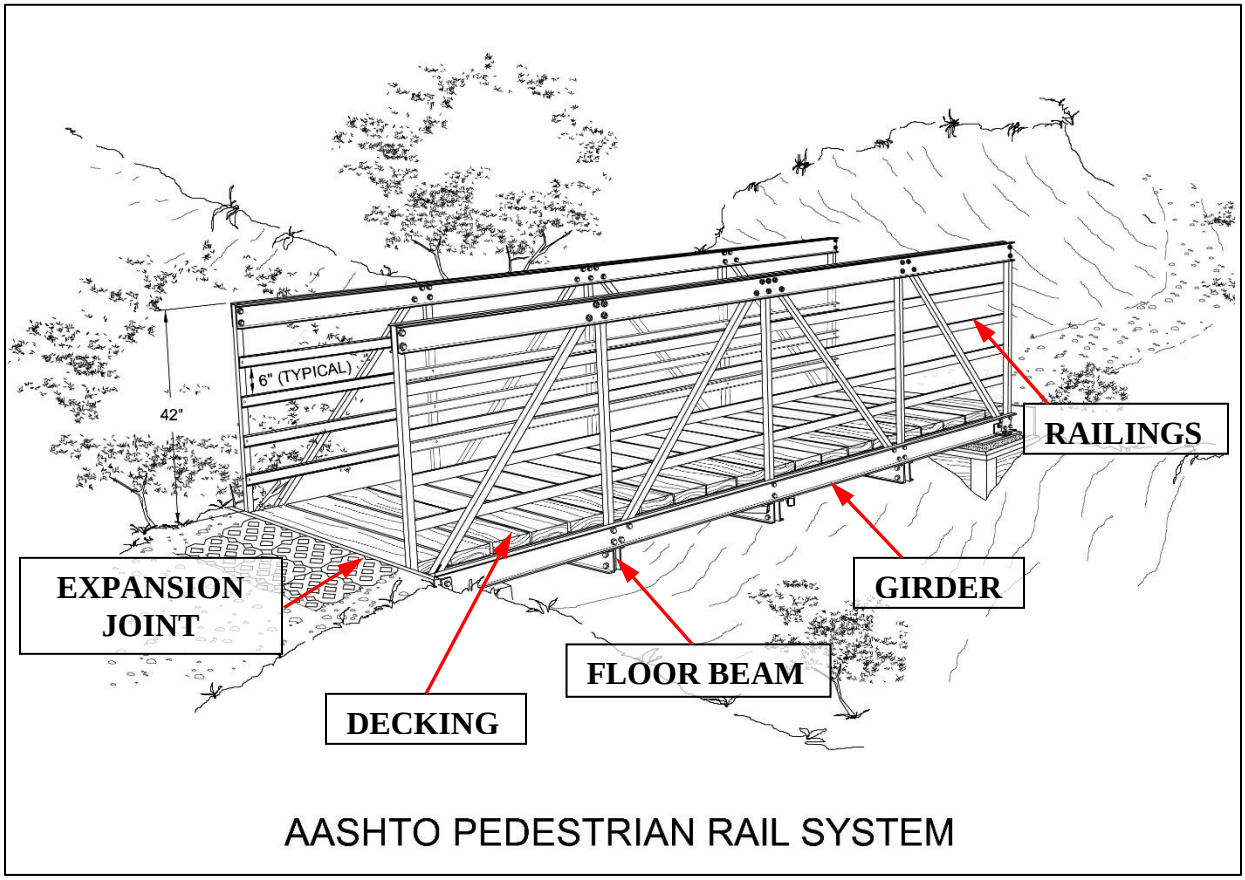
*Table 1. Signage Examples*

| Reflectors | Object Markers | Load Limit Signs | Warning or Advisory Signs | Bollards |
|---|---|---|---|---|
|    |   |     |     |   |

## 3.5 Bridge Superstructure

The bridge superstructure is defined as any portion of the bridge above the point of bearing. The superstructure of a typical, pedestrian bridge (Types A, D, and E) in Anchorage may include *railings, toe plates, decking, expansion joints, transverse floor beams* and *longitudinal girders or stringers*. The typical components of a pedestrian bridge superstructure are depicted in Figure 9. Please note that no toe plates are depicted in Figure 9.

*Figure 9. Bridge Superstructure*




Less commonly occurring pedestrian bridges in Anchorage are truss bridges (Bridge Type B) and culverts (Bridge Type C), addressed in Section 3.5.4 and Section 3.6, respectively.

During inspection, each element of the superstructure must be inspected and the condition of each element must be rated. The purpose of the condition rating is to provide an overall characterization of the general condition of the entire component being rated. The load carrying capacity of the component being rated has no bearing on the condition rating. Even if a bridge component was not designed to code and cannot carry legal loads, it could still be in great condition and thus could

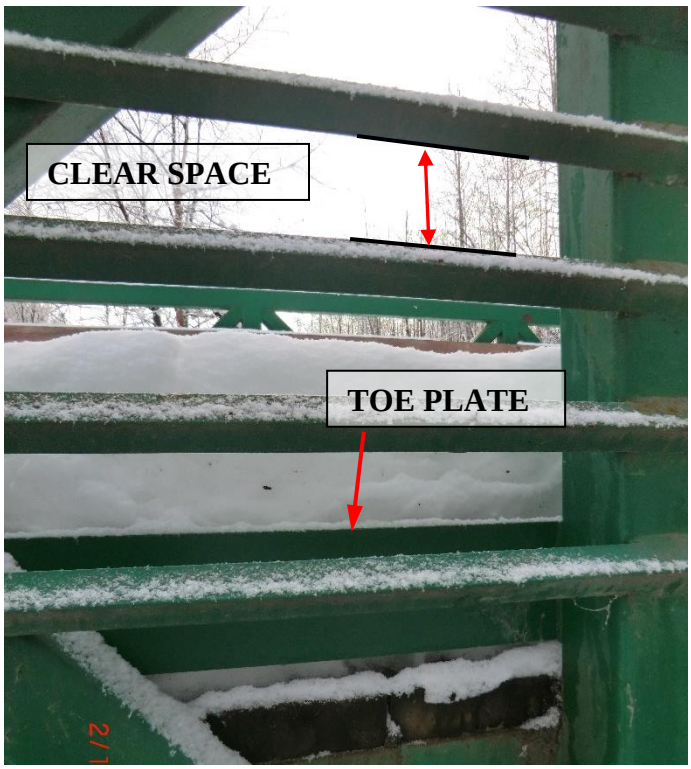
still receive a high condition rating. The load bearing rating requires structural analysis and should only be performed by an engineer.

### *3.5.1 Railing*

A properly designed bridge should meet AASHTO railing specifications for height, material, strength and railing configuration. Railings are designed to safely keep pedestrians or cyclists on the bridge. Bridge railings should be evaluated using the current AASHTO standard specifications.

As per Section 13.8 and 13.9 of the AASHTO LRFD Bridge Design Specifications, pedestrian bridges must have a railing height of 42 inches above the deck, while bridges with bicycle use should have a minimum height of 54 inches above the deck. Since Anchorage's trails are multi-use, each bridge should have railings with a minimum height of 54 inches in order to be up to code. The AASHTO design criterion further specifies that railings should have a minimum clear opening of 6 inches. If both horizontal and vertical railings are present, the 6-inch requirement applies to the lower 27 inches of the railing while 8 inches of clear space are allowed in the upper 27 inches. Additionally, mesh sizes in chain link of metal fabric fences should have minimum clear openings of 2.0 inches.

*Figure 10. Clear Space and Toe Plate*



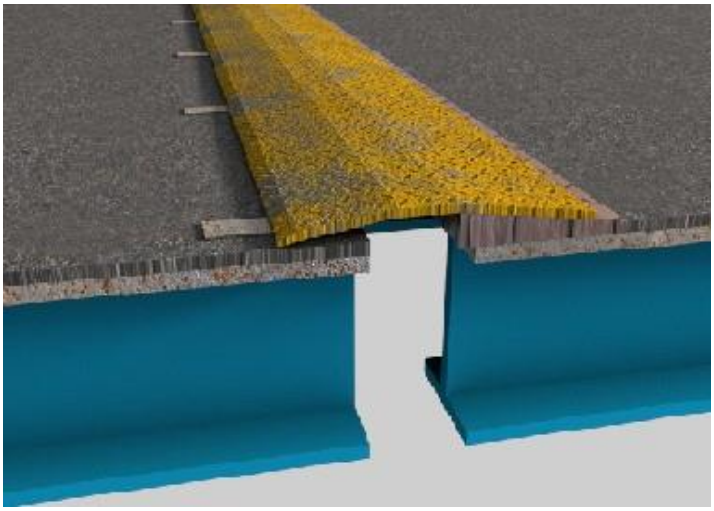

During inspection, the railing height must be verified by taking a measurement from the deck surface to the top of the railing. The clear space between horizontal and/or vertical railing members must also be measured. Clear space is measured from the edge of one railing to the edge of the next, as depicted in Figure 10. AASHTO requires that pedestrian bridges provide toe plates or curbs for safety, also depicted in Figure 10. During inspection, the presence or absence of a toe plate must be noted on the inspection survey. The inspector must also identify whether or not the bridge complies with the identified AASHTO specifications.

### *3.5.2 Decking*

The decking is comprised of deck material and deck overlay material. The inspector shall identify deck and deck overlay material and shall measure their thickness. If there is no deck overlay material, simply leave the field blank. More information on decking can be found in Section 3.5.5.

### *3.5.3 Expansion Joint*

*Figure 11. Typical Bridge Expansion Joint*



A bridge expansion joint allows the bridge to expand as it heats up in summer or to contract in colder temperatures. The joint allows the bridge to move as it's temperature or loading fluctuates or in the case of ground settlement or earthquakes. Figure 11 depicts a typical covered expansion joint. Figure 12 depicts a covered expansion joint at the Spenard Road Spur Bridge along the Chester Creek Trail in Anchorage. The inspector is responsible to measure the width of the expansion joint gap. The measurement should be taken at the widest part of the gap, as illustrated in Figure 13.

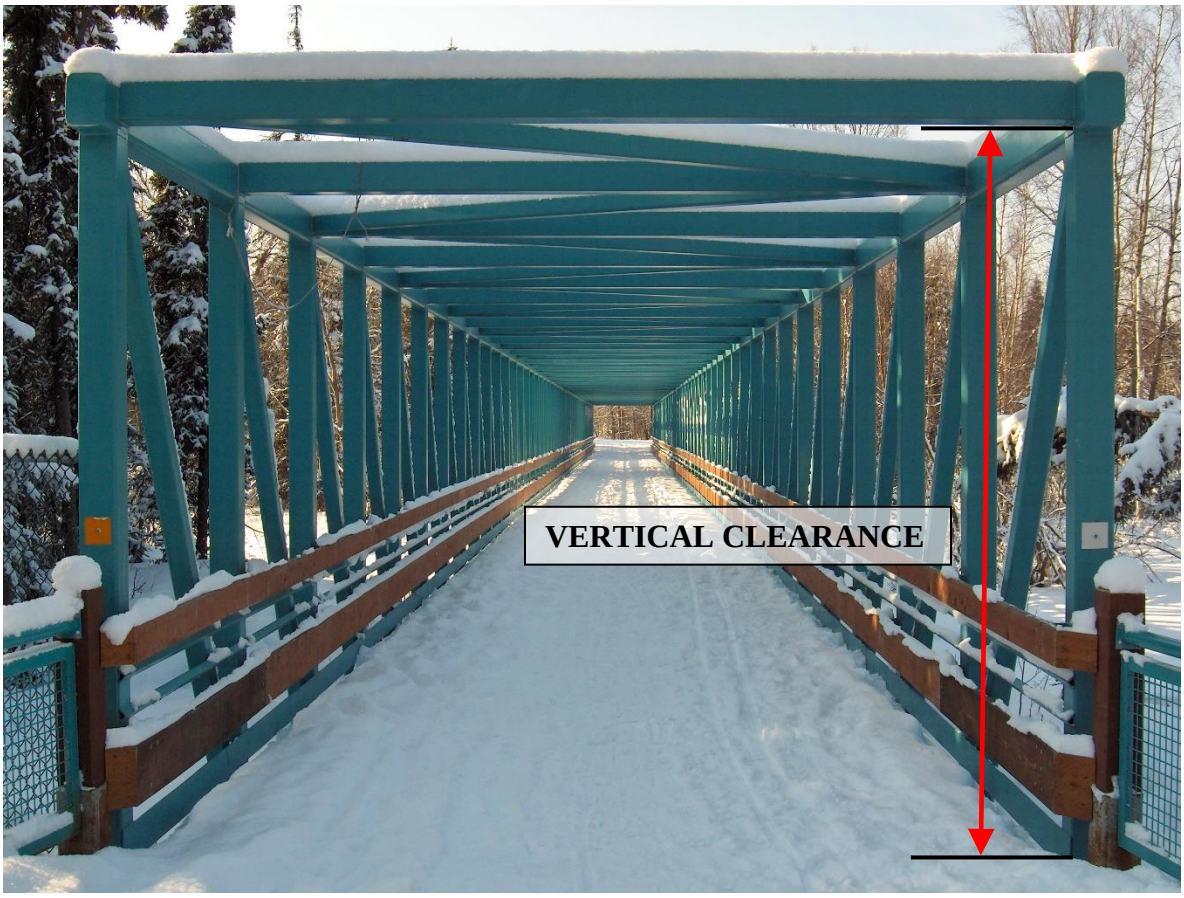
*Figure 12. Covered Expansion Joint*

*Figure 13. Expansion Joint Gap*

### *3.5.4 Truss Members*

If Bridge Type B is chosen in the General Information section of the survey, a truss section will automatically appear under the Superstructure Section. Truss bridges are easily identified because they are comprised of triangular units. The vertical height of truss members shall be recorded. If truss supported bridges have overhead members, the vertical clearance from the top of the deck to the bottom of the overhead members, as depicted in Figure 14, shall be recorded. This is necessary to ensure that utility vehicles could cross if necessary.

*Figure 14. Vertical Clearance on Truss Bridge*



### *3.5.4 Conditions*

The deficiencies and conditions of each member of the superstructure shall be assessed in order to provide condition ratings. As previously depicted in Figure 9, the main components of the superstructure include:

- Railings
- Truss members
- Deck and deck overlay
- Expansion joints
- Transverse floor beams
- Longitudinal girders or stringers

For each component of the superstructure, the inspection survey provides drop-down menus to assist the inspector in identifying the following:

- Material type
- Deformation
- Defects
- Deterioration
- Cracks

**Material type** options vary depending on the bridge element being inspected. Options for railings include *aluminum, concrete, masonry, steel, timber, wire, fiberglass,* and *other*. Decking overlay material may be *asphalt, concrete, fiberglass, non-slip surface, synthetic, other,* or *none.* Deck, floor beam (transverse), and stringer or girder (longitudinal) material choices include *aluminum, concrete, masonry, steel, timber,* or *other.* Expansion joint selections encompass *aluminum, elastomer, concrete, steel, timber,* and *other.* Elastomer is a fancy word that means rubber.

**Deformation** (Table 2) includes *buckled, bent, crushed, permanently deflected, ruptured or sheared* members, and *traffic damage*. Buckling is easy to spot because the member looks wrinkled or wavy. Buckling is most common in steel members. Bending, crushing and deflection are fairly straightforward. Rupture and shear are the most difficult to identify. If bolts have ripped out of a beam of if a beam has ripped in two, rupture or shear have likely occurred. Traffic damage should be obvious because the member should look like a vehicle or bicycle crashed into it or scraped it.

**Defects** (Table 3) include timber that has an *excessive grain slope*, *honeycomb in concrete*, *knots in timber,* and *loose or missing bolts*. Excessive timber grain slope means the wood grain is so sloped that it may have a reduced stress capacity. Honeycomb in concrete occurs when there is a cluster of holes, resembling a honeycomb, on the concrete surface.

**Deterioration** (Table 4) includes *chemical rust* on steel, wood *decay*, *insect attack*, *seasoning of timber*, and *uneven excessive wear*. Rust and decay are straightforward. Insect attack can be identified by small holes that have been chewed through the wood by insects. As timber continues to season (dry), vertical cracks, called checking, or horizontal cracks, termed shaking, may appear, lowering the timber's capacity. Uneven, excessive wear refers to surfaces or members that have worn out excessively due to overuse.

**Cracks** (Table 5) may appear in concrete or steel and may be *vertical*, *horizontal*, *diagonal*, *mapped*, on steel *welds*, or *spalled*. Map cracks are a series of small cracks that cover a surface. Spalling occurs when large flakes of material break off from a member.

When inspecting, each noted deficiency should be photographed. The app provides a "Condition" field that should be used to further specify and describe the condition of the component being assessed. For example, if horizontal cracks have been found in railing members, the length, width and location of the cracks should be recorded. If local buckling has been identified in stringers, the number of instances of local buckling should be expressed. If members are not visible due to snow, ice, or soil, this should be noted. If a girder is rusting, the severity and location of the rust should be described.

*Table 2. Deformation*

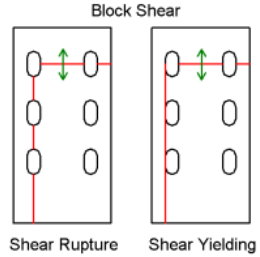
| Buckled | Bent | Crushed | Permanently Deflected | Ruptured or Sheared |
|---|---|---|---|---|
|  |  |  |   |    |

*Table 3. Defects*

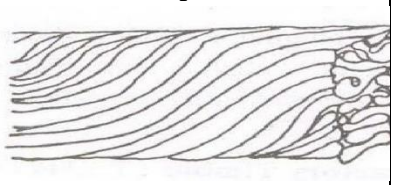
| Excessive Timber Grain Slope | Honeycombs in Concrete | Knots in Timber | Loose or Missing Bolts/ Hardware |
|---|---|---|---|
| "Excessive" if grain is very twisted or sloped  |  |  |  |

*Table 4. Deterioration*

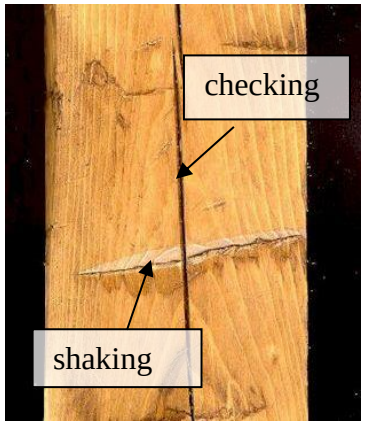
| Chemical Rust | Decay | Insect Attack | Seasoning of Timber |
|---|---|---|---|
|  |  |  |   |

*Table 5. Cracks*

| Vertical | Horizontal | Diagonal | Map | Weld | Spalling |
|---|---|---|---|---|---|
|  |  |  |  |  |  |

As information is collected for each component of the superstructure, the MOA Project B Survey requires that each component be quantitatively rated in the field. Since the rating system is subjective, it is best if the same inspector does not inspect each bridge in successive years. The rating system is as follows:

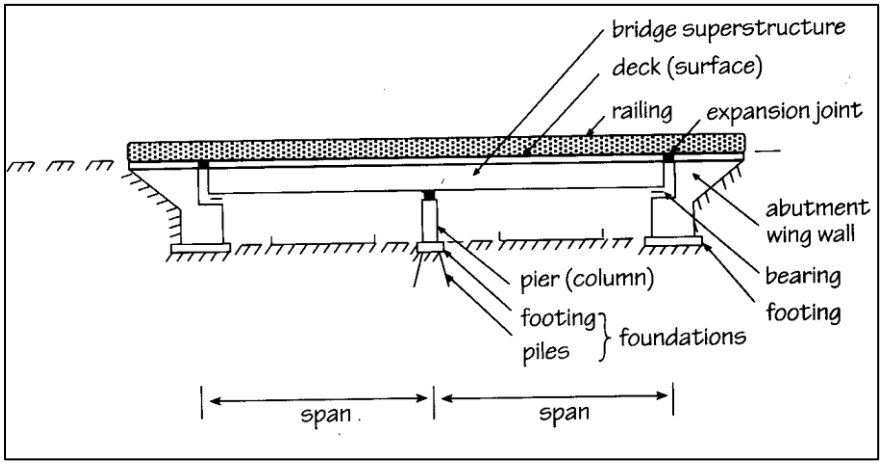
*Table 6. Rating System*

| Rating | Condition | Description |
|---|---|---|
| 0 | Failed Condition | Out of service. Beyond Corrective Action. |
| 1 | "Imminent" Failure Condition | Major deterioration or section loss present in railing components or obvious vertical or horizontal movement affecting railing stability. Bridge is closed to pedestrian traffic but corrective action may put bridge back into service |
| 2 | Critical Condition | Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close bridge until corrective action is taken. |
| 3 | Serious Condition | Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present. |
| 4 | Poor Condition | Advanced section loss, deterioration, spalling or scour |
| 5 | Fair Condition | All primary structural elements are sound but may have minor section loss, cracking, spalling or scour. |
| 6 | Satisfactory Condition | Structural elements show some minor deterioration. |
| 7 | Good Condition | Some minor problems noted. |
| 8 | Very Good Condition | No problems noted. |
| 9 | Excellent Condition | Excellent condition. |
| N | Not Applicable | Not applicable. |

## 3.6 Substructure

The bridge substructure is defined as any portion of the bridge below the point of bearing. The substructure of a typical, simply-supported pedestrian bridge in Anchorage may include *abutments, piers, retaining walls*, and *foundations*. The typical components of a Municipality of Anchorage pedestrian bridge substructure are depicted in Figure 15.

*Figure 15. Bridge Substructure*




As previously mentioned, culverts require special consideration and are addressed in Section 3.6 During inspection, each element of the substructure must be inspected, if possible, and the condition of each element must be assessed.

### *3.6.1 Abutments*

A bridge's abutment is the structure at each end of the bridge, which supports the bridge, as depicted in Figure 16. Abutments provide the bridge with lateral and vertical support and act as retaining walls.

*Figure 16. Abutments*

Abutments may be difficult to inspect if they are buried or if there is not enough crawl space under the bridge to allow access. The Tikishla Park Bridge North on the Chester Creek Trail in Anchorage has abutments that are very difficult to inspect, as depicted in Figure 17. In similar cases, the inspector should make his/her best effort to access the abutment while keeping safety in mind first.

*Figure 17. Limited Crawlspace*


### *3.6.2 Piers*

Piers are essentially columns that support the superstructure of a bridge at points in between the abutments as shown in Figure 18. Piers are not very common in pedestrian bridges that do not cross roads.

*Figure 18. Bridge Piers*

### *3.6.3 Retaining Walls*

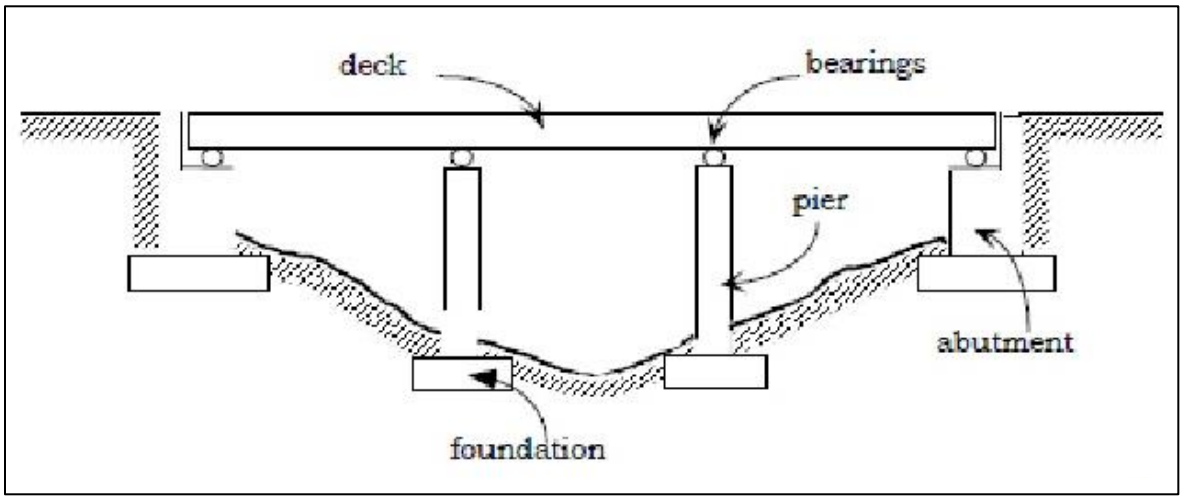
Retaining Walls are designed to resist lateral earth pressure and to keep soil at the ends of the bridge from eroding of moving. Retaining walls are not very common in pedestrian bridges that do not cross roads, since the abutment is typically sufficient to provide lateral support. Figure 19 depicts a pedestrian bridge retaining wall.

*Figure 19. Retaining Wall*

### *3.6.4 Foundations*

A pedestrian bridge foundation may simply be its abutment. Alternately, abutment, piers and retaining walls may be placed on top of foundation footings as depicted in Figure 20. The MOA Project B Survey provides fields to assess foundations if they are visible.

*Figure 20. Pedestrian Bridge Foundations*



### *3.6.5 Conditions*

The deficiencies and conditions of each member of the substructure shall be assessed in order to provide condition ratings. As previously depicted in Figure 15, the substructure may include:

- Abutments
- Piers
- Retaining Walls
- Foundations

The MOA Project B Survey provides options to assist the inspector in identifying the following categories for each component of the substructure:

- Material type
- Deformation
- Defects
- Deterioration
- Cracks

**Material type** options for substructure components may include *aluminum*, *concrete*, *masonry*, *steel*, *timber*, or *other*.

**Deformation** categories for substructures include *crushed* and *ruptured* members, or *other*. Reference Table 2 and the Deformation explanations in Section 3.5.4

**Defects** include timber that has an *excessive timber grain slope*, *honeycomb in concrete*, *knots in timber*, and *loose or missing bolts*. Reference Table 3 and the Defect explanations in Section 3.5.4.

**Deterioration** includes *chemical rust* on steel, wood *decay*, *insect attack*, *seasoning of timber*, and *uneven excessive wear*. Reference Table 4 and the Deterioration explanations in Section 3.5.4.

**Cracks** may be *vertical*, *horizontal*, *diagonal*, *mapped*, on *welds*, or *spalled*. Reference Table 5 and the Cracks explanations in Section 3.5.4.

When inspecting, each noted deficiency should be photographed. The inspection survey provides a "Condition" field that should be used to further specify and describe the condition of the component being assessed. For example, if horizontal cracks have been found in the abutment, the width and location of the cracks should be recorded. If members are not visible due to snow, ice, or soil, this should be noted. If there is efflorescence or moss on the concrete, the location and severity should be described. For example, "the concrete abutment exhibits localized efflorescence on the left side of Approach 1." Efflorescence, or chloride contamination, occurs when salt migrates to the surface of the concrete, where it leaves a whitish stain, as shown in Figure 21.

*Figure 21. Concrete Efflorescence*

As information for each component of the substructure is collected, the inspection survey requires that each component be quantitatively rated in the field. Since this rating system is subjective, it is best if the same inspector does not inspect each bridge in successive years. The rating system is outlined in Table 6 in Section 3.5.4.

## 3.7 Culvert

Culverts require special consideration since they do not contain a typical superstructure and substructure. The inspection survey asks the inspector whether or not the bridge is a culvert. If culvert is chosen, the survey will automatically be modified to only include fields that are relevant to a culvert. A drop down menu will assist the inspector in describing the general shape of the culvert. Culverts may be single pipe, multiple pipe, single pipe arch, multiple pipe arch, single box, or multiple box, as depicted in Table 7.

*Table 7. General Culvert Shapes*

| Single and Multiple Pipe | Single and Multiple Pipe Arch | Single and Multiple Box |
|---|---|---|
|  |  |  |

When inspecting, the water flow relative to the inside apex of the culvert shall be measured and recorded, as shown in Figure 22.

*Figure 22. Flow Relative to Top of Culvert*

Culverts used for pedestrian or multi-use trails are typically small and may not contain all the features that a large culvert may have. Thus for the purposes of inspecting pedestrian culverts, only the following components need to be considered:

- Railings
- Surface
- Parapets and Walls
- Culvert
- Inlet and Outlet Aprons

### *3.7.1 Railings*

The railing inspections are the same as for typical (non-culvert) pedestrian bridges. Reference Section 3.5.1.

### *3.7.2 Surface*

The surface of a culvert is analogous to the decking of a typical (non-culvert) pedestrian bridge.

### *3.7.3 Parapets and Walls*

Culvert parapets are barriers that may extend above the top of concrete or timber culverts, as depicted in Figures 23 and 24.

*Figure 23. Timber Parapet*

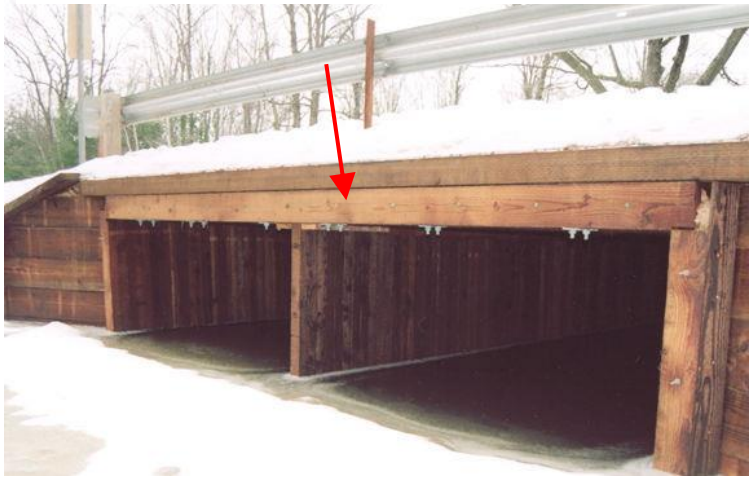
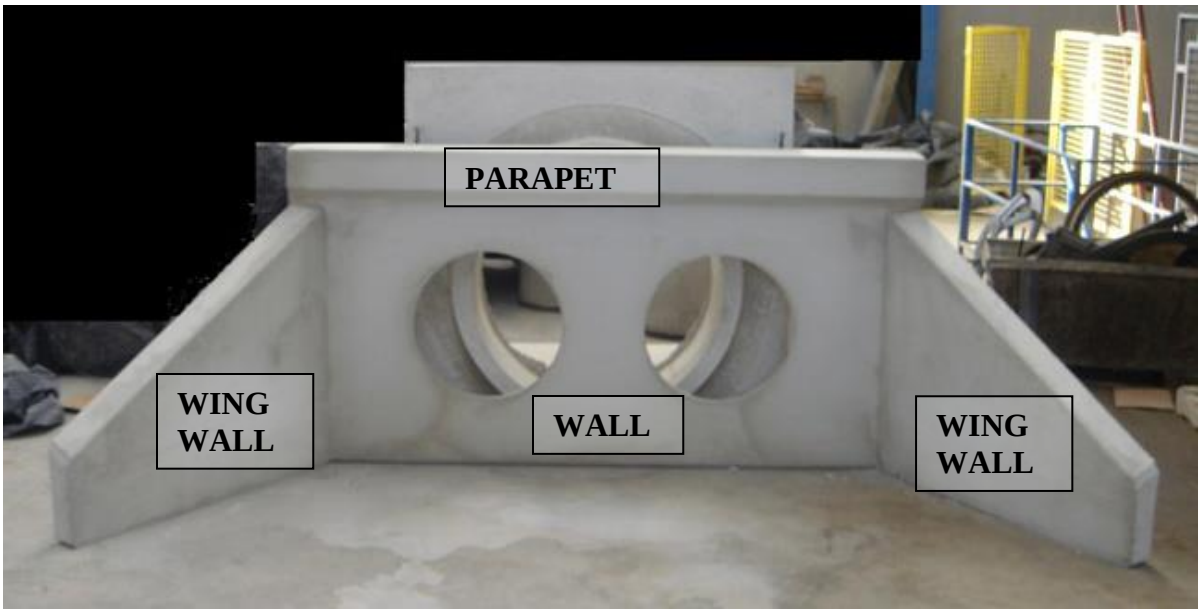


*Figure 24. Concrete Parapet*

Culvert walls may extend below the parapet and may include wingwalls, as depicted in Figure 25.

*Figure 25. Culvert Walls*




### *3.7.4 Culvert*

The portion of the culvert that allows water to flow from one side of the trail to the other side of the trail should also be inspected if possible. It may be difficult to inspect due to the presence of water, debris, snow or ice. The interface between the culvert and the culvert walls should be inspected and gaps should be noted and measured (see Figure 26).

*Figure 26. Corrugated Steel Culvert*

### 3.7.5 Inlet and Outlet Aprons

Inlet and outlet aprons (Figures 27 and 28) help conduct water away from the culvert inlets and outlets to mitigate erosion and undercutting. If they are present, they should be inspected to ensure that they are not damaged or rendered useless due to debris or ice.

*Figure 28. Steel Apron*

*Figure 27. Concrete Apron*


### 3.7.6 Conditions

The deficiencies and conditions of each member of the culvert shall be assessed in order to provide condition ratings. As previously stated, pedestrian culverts may include:

- Railings
- Surface
- Parapets and Walls
- Culvert
- Inlet and Outlet Aprons

The MOA Project B Survey provides fields to assist the inspector in identifying the following for each component of the culvert:

- Material type
- Deformation
- Defects
- Deterioration
- Cracks

**Material type** options for railings can be found in Section 3.5.4. Surface material type options include *asphalt*, *concrete*, *dirt*, *masonry*, and *other*. Culvert, parapet/wall, and inlet/outlet apron materials include *concrete*, *masonry*, *steel*, *timber*, and *other*.

**Deformation** options for railings can be found in Section 3.5.4. Surface deformations can be classified as *upheaval*, *rutting*, or *other*. Upheaval includes frost heaves or heaves caused by root damage. Rutting is self-explanatory. Culvert, parapet/wall, inlet/outlet deformation can be described as *bent*, *crushed*, *ruptured*, or *other* (Reference Table 2 in Section 3.5.4).

**Defects** options for railings can be found in Section 3.5.4. Surface defects encompass *bleeding*, *honeycombs in concrete*, *polished aggregate*, *raveling*, and *other*, as depicted in Table 8. Bleeding occurs when hot weather causes asphalt binder to fill aggregate voids and permanently expand onto the asphalt surface, creating a shiny, reflective surface. Honeycomb in concrete describes a cluster of holes, resembling a honeycomb, on the concrete surface. Polished aggregate occurs when aggregate extending above pavement asphalt binder is very small or very smooth, causing the surface to be slippery. Raveling is caused when aggregate is dislodged from the asphalt or when oxidation causes the asphalt binder to age, resulting in a porous and rough surface. Culvert, parapet/wall, and inlet/outlet defects include the same choices as for railings (Reference Table 3 in Section 3.5.4).

*Table 8. Surface Defects*

| Bleeding | Honeycombs in Concrete | Polished Aggregate | Raveling |
|---|---|---|---|
|  |  |  |  |

**Deterioration** options for railings can be found in Section 3.5.4. Surface deterioration may be due to *uneven excessive wear*, *pothole*, or *other*. Culvert, parapet/wall and inlet/outlet apron deterioration is the same as for railings (Reference Table 4 in Section 3.5.4).

**Cracks** may be *vertical*, *horizontal*, *diagonal*, *map*, on *welds*, or *spalled*. Reference Table 5 in Section 3.5.4.

When inspecting, each noted deficiency should be photographed. The MOA Project B Survey provides a "Condition" field that should be used to further specify and describe the condition of the component being assessed. For example, if horizontal cracks have been found in the culvert wall, the width and location of the cracks should be recorded. If the crack is very small (ie. hairline), no width measurement is necessary. If culvert components are not visible due to snow, ice, or soil, this should be noted. If there is spalling on the concrete or if a corrugated steel culvert is separated from its concrete wall, the location and width of the gaps should be described. For example, "the 36 inch corrugated steel culvert is separating from the concrete wall and the gap is about 2.5 inches wide."

As information for each component of the culvert is collected, the inspection survey requires that each component be quantitatively rated in the field. Since this rating system is subjective, it is best if the same inspector does not inspect each bridge in successive years. The rating system is outlined in Table 6 in Section 3.5.4.

## 3.8 Hydrology

An important aspect of bridge inspections involves investigating the water feature that the bridge or culvert crosses.

### *3.8.1 Flooding*

The bridge or culvert must be able to withstand flooding. Thus, if known flooding has occurred since the last inspection, this should be noted in the app. If the bridge/culvert walls, piers, or abutments show staining corresponding to a flood line, or if the presence of debris or scouring along the bank indicate a flood line, this should be noted. If flooding has occurred, the flood line relative to the deck (measured from the top of the deck down to the flood line) should be measured and recorded. This measurement will not like be very exact since it would likely correspond to the distance from the deck to the top of a pile of debris along the bank. However, if measurements were not taken while the flood occurred, these rough measurements will give an indication of how closely the water level approached to the deck of the bridge or the surface of the culvert. Additionally, any accumulation of drift or debris on the bridge should be recorded.

### *3.8.2 Waterway*

The slope material must be noted. Available options include *concrete*, *geofabric*, *soil*, *riprap* (rocks), or *other*. The condition of the slope should also be briefly described. The inspector should specifically check for visible signs of excessive water velocity which may lead to scour or erosion.

### *3.8.3 Scour and Erosion*

Scour and erosion can cause bridges to fail by undercutting the abutments, piers, walls and foundations. If scour is occurring, as portrayed in Figure 29, the location and estimated depth and width of the scour should be recorded in the inspection survey.

*Figure 29. Scour at South Tikishla Bridge*

### *3.8.4 Conditions*

When inspecting, the occurrence of any scour or erosion should be photographed. The condition of the waterway and any scour that may be occurring must be assessed and rated using Table 9 (next page) as a guide.

Figure 30 depicts various scour severities in relation to foundation footings. The hatched line represents the soil level. If the soil is near the bottom of the footing or "Below spread-footing base," the foundation has either failed or is near failure, corresponding to scour condition ratings of 0, 1, or 2. When the soil is "Within limits of footing or piles," the foundations may be exposed or unstable, corresponding to scour rating conditions of 3, 4 5, or 6. When the soil is "Above top

of footing," bridge foundations are stable, corresponding to scour condition rating numbers of 7, 8, or 9.

*Figure 30. Scour Conditions*

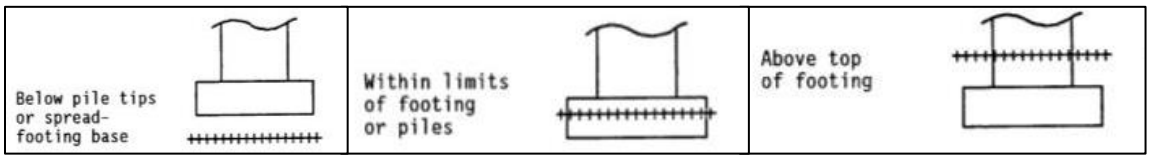


*Table 9. Scour Rating*

| Rating | Condition | Description |
|---|---|---|
| 0 | Failure Condition | Bridge is closed. Channel has failed or bridge has excessive scour. |
| 1 | "Imminent" Failure Condition | Bridge is closed. Channel has failed but corrective action may put it back in light service; Failure of piers/abutments is imminent. |
| 2 | Critical Condition | Channel has meandered to extent that bridge is near state of collapse; Extensive scour has occurred at bridge foundations, requiring immediate action. |
| 3 | Serious Condition | Sediment accumulation or erosion threaten bridge or trail; Bridge foundations are unstable due to scour. |
| 4 | Poor Condition | Bank or embankment protection are severely undermined; Foundations may be exposed due to erosion or corrosion and action should be taken. |
| 5 | Fair Condition | Bank protections are being eroded; Trees and brush restrict the channel; Bridge foundations are stable. |
| 6 | Satisfactory Condition | Bank is beginning to slump and minor stream bed movement is evident; There is minimal scour near foundations. |
| 7 | Good Condition | Bank protection is in need of minor repairs; Countermeasures may have been installed to correct previous problem. |
| 8 | Very Good Condition | Banks are protected or well vegetated; Bridge foundations are stable and any scour is above top of foundation. |
| 9 | Excellent Condition | There are no channel deficiencies; Bridge foundations are on dry land well above flood water elevations |
| N | Not Applicable | The bridge is not over a waterway. |

# 4.0 THE INSPECTION APPLICATION

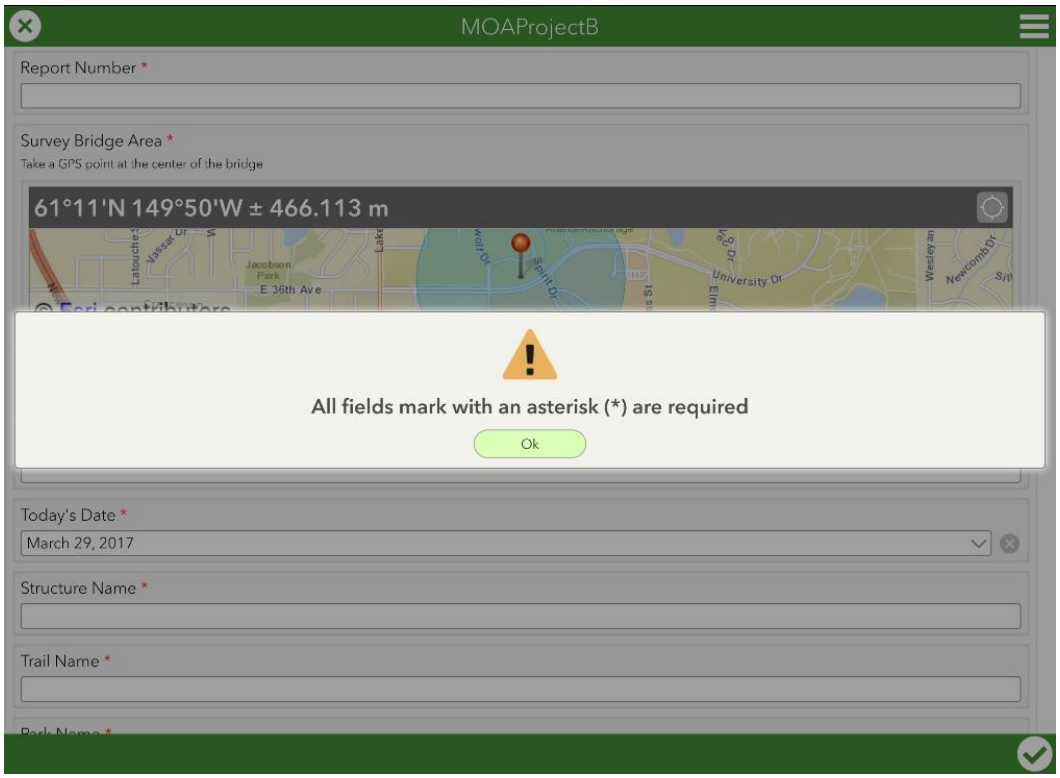
In order to use the MOA Project B Survey to perform a routine pedestrian bridge inspection, the free Survey 123 Application must be downloaded onto the device that will be used for inspection. Any device with an iOS or Android operation system may be used. After the Survey 123 Application is downloaded, the MOA Project B Survey must be opened using a digital key. The key can be acquired from the MOA Parks and Recreation Department. The key is essentially an internet link that will open the tailored MOA Project B Survey in the Survey 123 Application.

## 4.1 Conducting the MOA Project B Survey

Once the MOA Project B Survey is opened, the inspector must click on the "Start Survey" button in order to conduct the inspection.

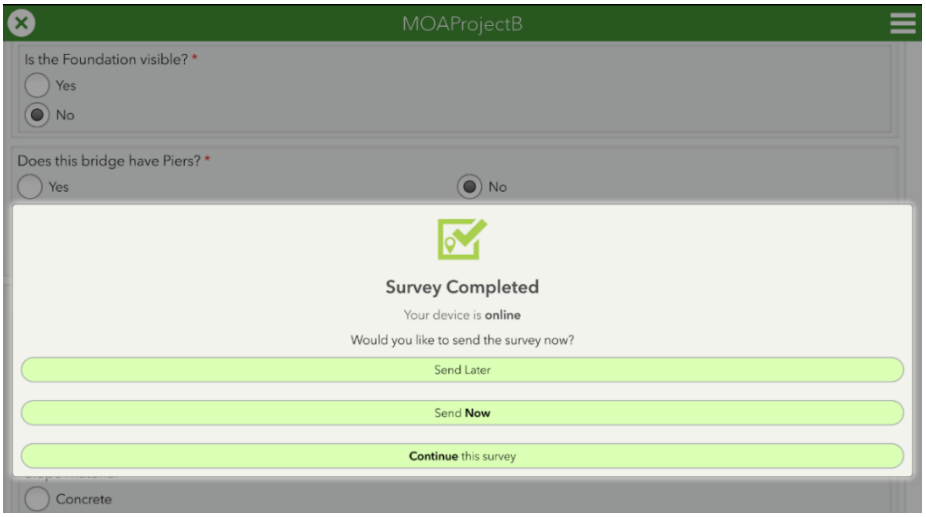
Before completing the bridge inspection, all required fields must be filled in properly. Required fields are marked with a red asterisk. If an attempt is made to submit a survey when required fields are not properly filled, an error message will appear, as shown in Figure 31. Click on the "Ok" button to automatically navigate to the blank required field.

*Figure 31. Error Message*



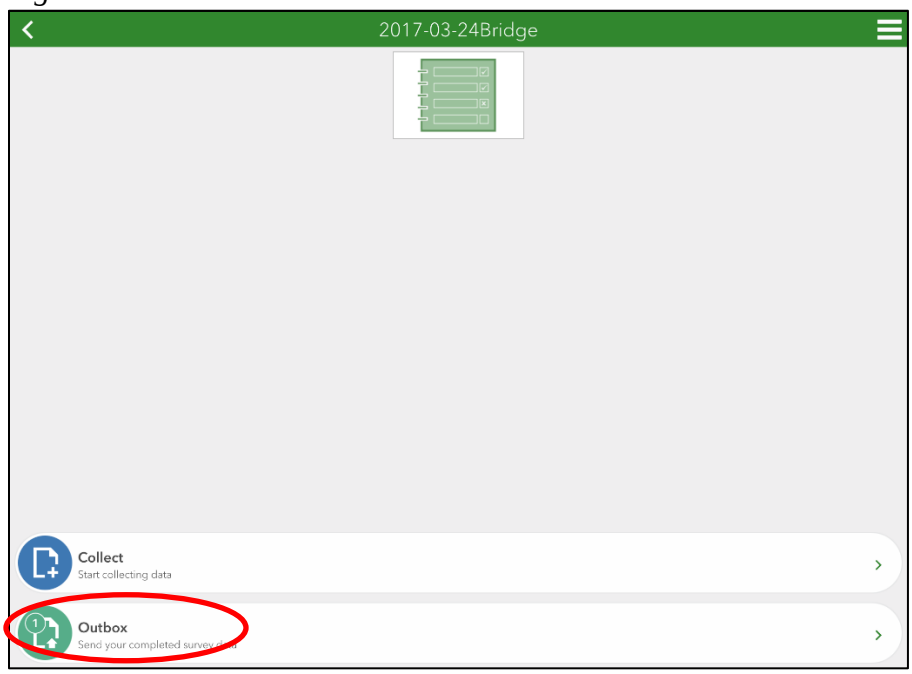
After completing the inspection, the inspector can choose "Send Later" or "Send **Now**," as depicted in Figure 32.

*Figure 32. Survey Completed*



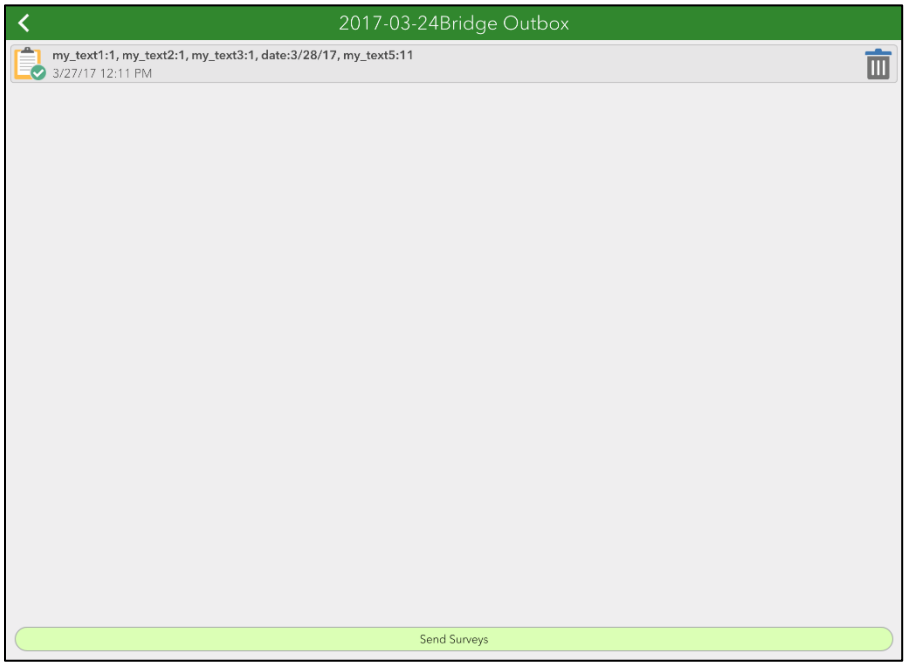

If there is unlimited bandwidth on the device being used, choose "Send **Now**" to immediately send the inspection to the ESRI cloud-based server. However, if the device has limited bandwidth, choose "Send Later." The inspection report will then be stored on the device. At the end of the day, when the inspector returns to the office, the device can be connected to the Wi-Fi and all inspection reports can be submitted at one time. To submit all reports at one time, click on the outbox button, shown in Figure 33.

*Figure 33. Outbox Button*



Next, select your inspection reports and click, “Send Surveys,” as depicted in Figure 33.

*Figure 34. Send Surveys*




It is important to note that each inspection report takes up to 10 MB or storage. If multiple inspections are being performed in one day and the device has limited bandwidth, make sure the device has sufficient storage space. Before leaving to office to begin inspections, always make sure the device’s battery is fully charged.

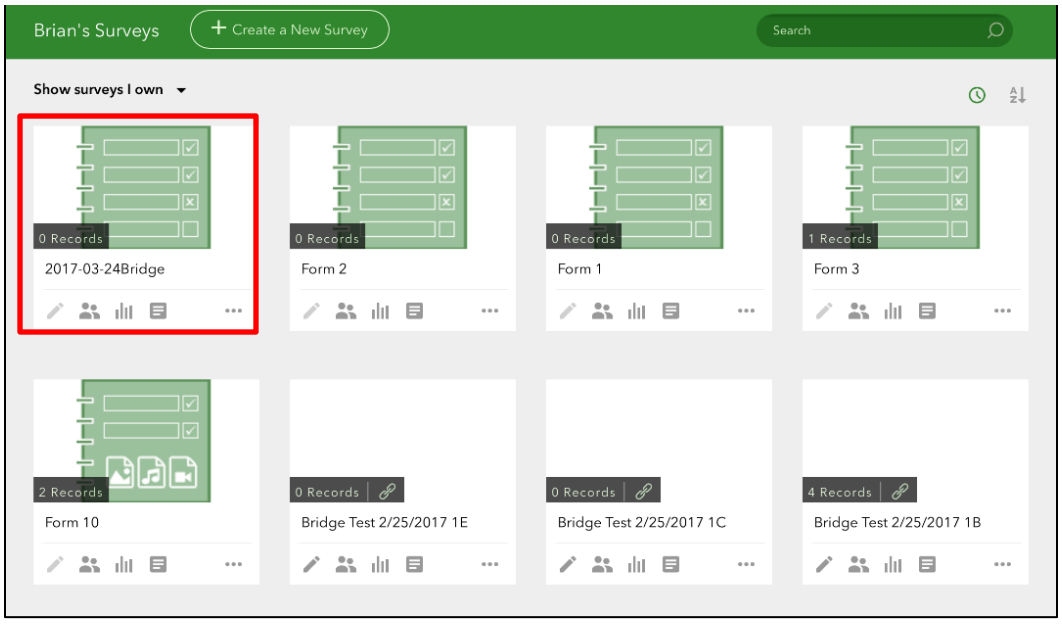
## 4.2 Dealing with Photos

As mentioned in Section 3.0, photos should be taken during pedestrian bridge inspections. These photos may be taken on a camera, iPad, phone or other device. The photos cannot be uploaded to the ESRI server simultaneously with the inspection reports due to data limitations and survey usability. At the end of each inspection day, photos should be sent to the GIS department within the Municipality Parks and Recreation Department. The GIS team will upload the photos to the cloud.

## 4.3 How to Access Data

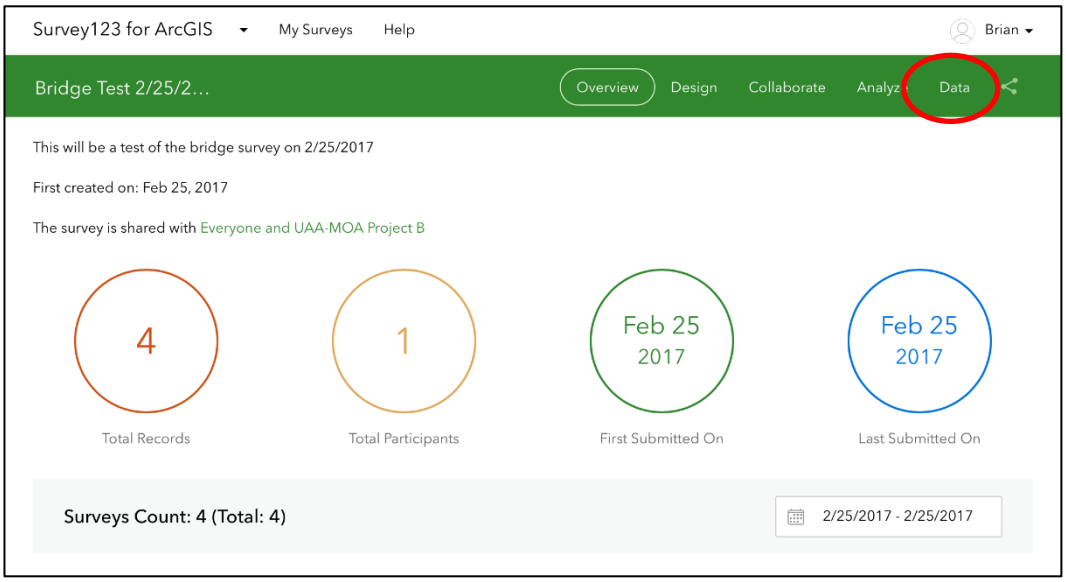
Once inspection surveys have been completed and sumbitted to the ESRI server, they can be accessed online. Go to survey123.com and log in with the user name and password that will be provided by Parks and Recreation. After logging in, all uploaded inpsection surveys will be shown, as depicted in Figure 35. The green task bar will say "Parks and Recreation's Surveys." In order to view a specific survey, click once on the survey (anywere in the area outlined with a red box).

*Figure 35. Access Data Online.*



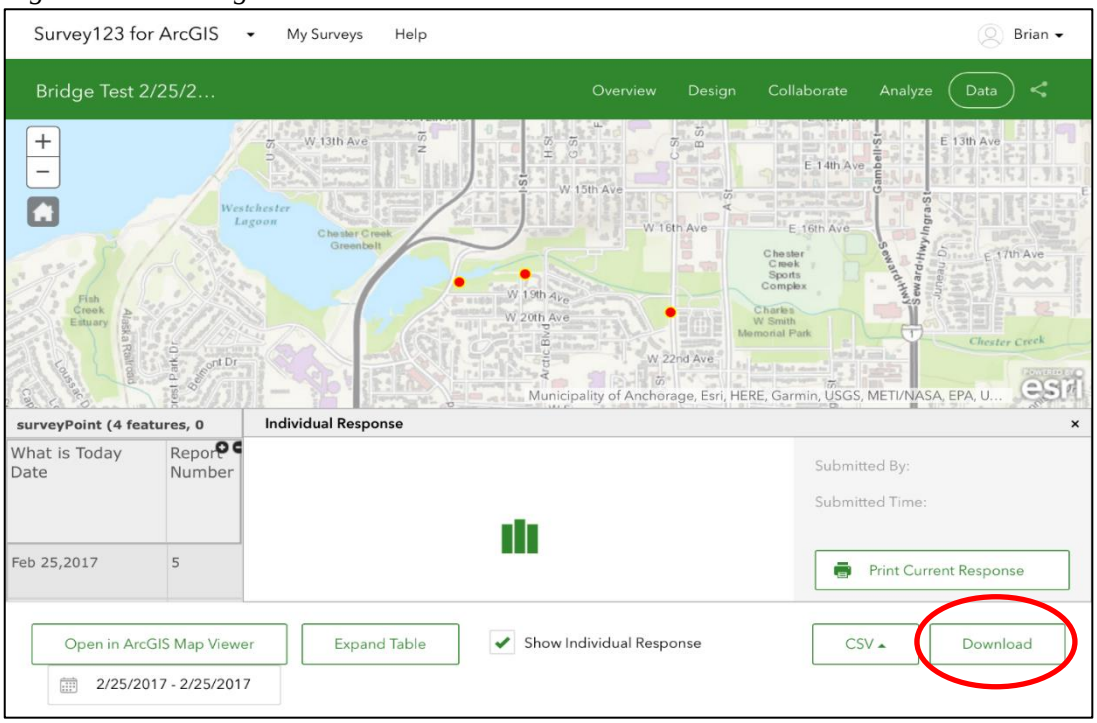

Clicking on the survey will navigate to an "Overview Page" page, shown in Figure 36.

*Figure 36. Overview Page*




Click on the “Data” button to navigate to the data page shown in Figure 37. From the data page, the inspection report can be printed to PDF by clicking the "Print Current Response” button. Alternately, the file can be downloaded as a CSV, Shapefile or File Geodatabase. File type options can be selected from the drop down menu circled in red. To view the bridge location in the ArcGIS map viewer, click on “Open in ArcGIS Map Viewer.”

*Figure 37. Data Page*



# 5.0 CONCLUSION

The MOA Project B Survey and this MOA Project B Pedestrian Bridge Inspection Guide were designed for use by MOA Parks and Recreation employees. Following the procedure delineated in the guide will enable MOA to perform routine inspections of pedestrian bridges along the MOA trail system. The MOA Project B Survey will provide condition ratings for each component of inspected bridges and will populate a geodatabase containing bridge inspection information and photos. If a bridge is alarmingly deficient and has condition ratings of 0, 1, 2, or 3, a structural engineer should perform a full inspection and structural analysis of the deficient bridge.

The formulated survey, guide and geodatabase are valuable tools that can be utilized to assist Parks and Recreation in making thoughtful decisions that prioritize safety on Anchorage's trails, determine where capital improvements should be directed, and identify which pedestrian bridges or trail segments merit rehabilitation. Any questions in regards to this Pedestrian Bridge Inspection Guide or the MOA Project B Survey should be directed to the Municipality of Anchorage Parks and Recreation Park Superintendent.

## Appendix E – MOA Project B Application Key

The electronic file for Appendix E can be found on the USB flash drive that accompanies this report.