

Appendix H

UBIT access memorandum by Sargent Engineers

To: Mr. Aaron Knight, PE - SCJ Alliance
Ms. Vicki Grover, PE - City of Bremerton, Engineering Division

From: Jessica Soward, PE, SE

Date: April 8, 2023

RE: Warren Avenue Bridge Improvements ~ Under Bridge Inspection Truck Access
Project No.: A21137.00

INTRODUCTION

Sargent Engineers is providing structural engineering services to SCJ Alliance in support of the Warren Avenue Bridge Pedestrian Improvements project for the City of Bremerton. The purpose of the project is to study a variety of alternatives for providing improved non-motorized access across the existing Warren Avenue Bridge (a.k.a. Port Washington Narrows Bridge) via installation of wider bridge sidewalks, and to determine a preferred sidewalk improvement alternative.

PROJECT BACKGROUND

The project is evaluating sidewalk retrofits to improve access and safety for pedestrians and bicyclists using the Warren Avenue Bridge. Sidewalk widths ranging from 8 to 16-feet are being considered, with some configurations retrofitting the sidewalks on both sides of the bridge, while other configurations retrofit the sidewalk on one side of the bridge. Part of evaluating the various bridge sidewalk widening options is determining whether the resulting modifications are feasible to inspect and maintain using available access equipment and methods.

The bridge is owned and maintained by the Washington Department of Transportation (WSDOT). The bridge has non-redundant steel tension members (NSTM), which requires up-close inspection of the main steel bridge components every two years to satisfy Federal Highway Administration requirements for the National Bridge Inventory. The bridge spans high above the Port Washington Narrows waterway, making access to the bridge members for the required inspections and repairs difficult.

Two main special access techniques are commonly used to access tall bridges over open waterways: specialized access equipment such as Under Bridge Inspection Trucks (UBITs), and rope access techniques such as belaying. UBITs carry personnel and materials to the needed locations in a bucket or platform attached to an articulating hydraulic arm. The hydraulic arm is typically attached to a truck chassis, which is either counterbalanced or has outriggers to maintain stability. There are different sizes of UBITs to accommodate different bridge configurations. Rope access techniques use a system of safety ropes which the personnel are attached to by safety harnesses to prevent falls while accessing various parts of the bridge. Rope access is a labor-intensive technique which doesn't easily facilitate repair work, and not all structures are easily rigged.

WSDOT currently uses a UBIT to conduct inspection and maintenance operations on the Warren Avenue Bridge. The biggest UBIT they currently have in their fleet is an A62 manufactured by Aspen Aerials. A larger A62T model UBIT is also available from Aspen Aerials. This memo summarizes the capabilities of the two UBITs in reference to the sidewalk widening options.

WSDOT'S EXISTING UBIT: A62

WSDOT's largest existing UBIT is an A62 model. Aspen Aerials lists the curb-to-edge of bridge sidewalk clearance as 13-foot maximum:

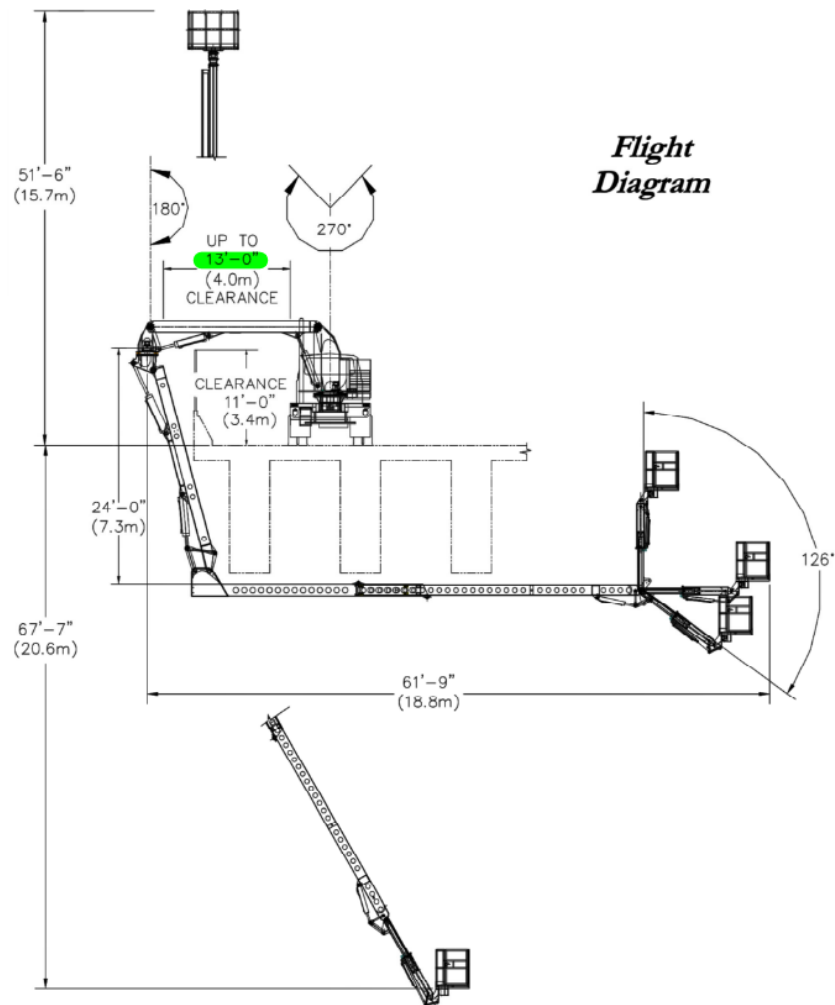


Figure 1: Aspen Aerial A62 Flight Path

It is important to note that the specified reach is measured from the traffic curb line to the extreme outside edge of the bridge sidewalk; the corresponding clear sidewalk width is smaller because of the presence of traffic barriers and pedestrian railings. The proposed sidewalk improvements for the Warren Avenue Bridge include a concrete traffic barrier separating the traffic lane from the sidewalk, and a pedestrian railing along the outside edge of the sidewalk. Assuming typical dimensions of WSDOT concrete barriers and pedestrian railings, and the needed maneuvering clearance to the structure, the clear sidewalk width is approximately 3-feet narrower than the curb-to-edge distance. With a reach of 13-feet, the WSDOT A62 UBIT can accommodate a clear sidewalk width of up to 10-feet for the proposed Warren Avenue Bridge Improvements. For new sidewalks up to 10-feet clear on one or both sides of the bridge, the A62 would be able to access the areas needed for the NSTM inspection through a series of deployments over both sides of the bridge. This has been confirmed through on-going clarification and discussion with the WSDOT Bridge & Structures Office¹.

The operating weight of an A62 UBIT is approximately 32-Tons, which the Warren Avenue Bridge will have capacity to carry including the additional weight of the sidewalk retrofit.

¹ Email correspondence between Aaron Knight of SCJ Alliance and Richard Zeldenrust of WSDOT, dated Sept-Oct 2022.

UBIT WITH LARGER REACH: A62T

Aspen Aerials manufactures a UBIT model called the A62T specifically designed to reach over wider sidewalks, with a maximum curb-to-edge of bridge reach of up to 17-feet. The clearance for the proposed sidewalk widening and railing configurations was confirmed with the Manufacturer² to be 17-feet with the first boom positioned perpendicular to the bridge rail. Assuming typical dimensions of WSDOT concrete barriers and pedestrian railings, and the needed maneuvering clearance to the structure, the A62T UBIT can accommodate a clear sidewalk width of up to 14-feet for the proposed Warren Avenue Bridge improvements. For new sidewalks up to 14-feet clear on one or both sides of the bridge, the A62T would be able to access the areas needed for the NSTM inspection through a series of deployments over both sides of the bridge. This has not been confirmed by WSDOT.

The operating weight of an A62T UBIT is approximately 38-Tons, which the Warren Avenue Bridge will have capacity to carry including the additional weight of the sidewalk retrofit.

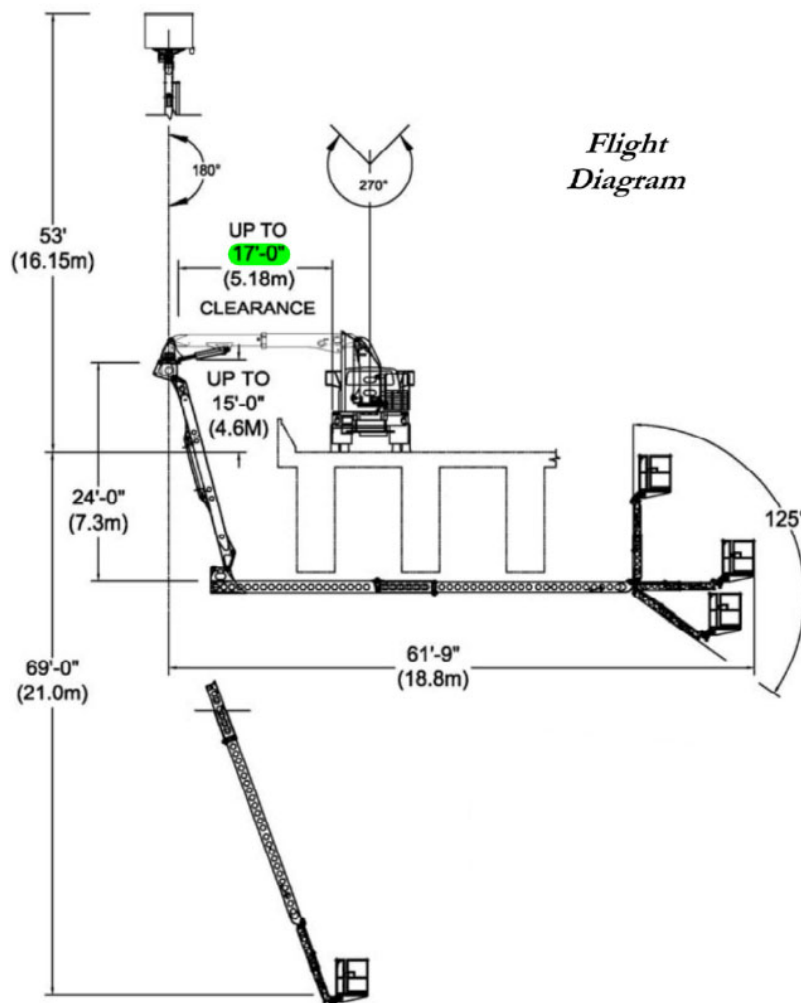


Figure 2: Aspen Aerial A62T Flight Path

² Email correspondence between Jessica Soward of Sargent Engineers and Greg DeBilzan of Aspen Aerials, dated March 2023

CONCLUSIONS

The existing WSDOT A62 UBIT has been confirmed to have a maximum curb-to-edge reach of 13-feet for the proposed sidewalk retrofit and railing configurations, corresponding to a 10-foot maximum clear sidewalk width. For new sidewalks up to 10-feet clear on one or both sides of the bridge, the A62 would be able to access the areas needed for the NSTM inspection through a series of deployments over both sides of the bridge.

The larger A62T UBIT has been confirmed to have a maximum curb-to-edge reach of 17-feet for the proposed sidewalk retrofit and railing configurations, corresponding to a 14-foot maximum clear sidewalk width. For new sidewalks up to 14-feet clear on one or both sides of the bridge, the A62T would be able to access the areas needed for the NSTM inspection through a series of deployments over both sides of the bridge.

The Warren Avenue Bridge has the weight capacity to carry either UBIT, including the weight of the proposed retrofits.

It has been our pleasure providing this information to the design team. Please let me know if you have any questions or comments.

Respectfully,
Sargent Engineers, Inc.

Jessica Soward, PE, SE
Principal



JSS

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SARGENT

EMAIL CORRESPONDENCE

FW: SR 303 Warren Avenue Bridge; A-62 Reach Limits

Aaron Knight <aaron.knight@scjalliance.com>

Mon, Oct 10, 2022 at 12:05 PM

To: "Zeldenrust, Richard" <ZeldenR@wsdot.wa.gov>

Cc: Vicki Grover <vicki.grover@ci.bremerton.wa.us>, Jessica Soward <jessicas@sargentengineers.com>

Hi Rich,

We looked into it further and anticipate a 54" rail, as is standard when bikes are present.

Thanks,

Aaron

Aaron Knight, PE**SCJ Alliance***Project Manager*

o. 253.201.0777, ext. 293

m. 253.365.1862

www.scjalliance.com

From: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>**Sent:** Monday, October 10, 2022 11:26 AM**To:** Aaron Knight <aaron.knight@scjalliance.com>**Cc:** Vicki Grover <vicki.grover@ci.bremerton.wa.us>**Subject:** RE: [EXTERNAL] RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits

Aaron,

I know that the rail height "not to exceed" dimension for a 12' wide (total) sidewalk is still an open question. I am still trying to obtain input from our BPO Inspectors, and from the UBIT Drivers.

Richard Zeldenrust P.E. S.E.**Structural Design Unit Supervisor**

7345 Linderson Way SW

Tumwater, WA 98501

Desk: 360.705.7196



From: Aaron Knight <aaron.knight@scjalliance.com>
Sent: Thursday, September 29, 2022 5:02 PM
To: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>
Cc: Vicki Grover <vicki.grover@ci.bremerton.wa.us>
Subject: RE: [EXTERNAL] RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits

Ok, sounds good. Thank you!

Aaron Knight, PE

SCJ Alliance

Project Manager

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From: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>
Sent: Thursday, September 29, 2022 5:00 PM
To: Aaron Knight <aaron.knight@scjalliance.com>
Subject: RE: [EXTERNAL] RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits

I can ask, but the answer would probably be forthcoming next week. May need more input from the Drivers.

From: Aaron Knight <aaron.knight@scjalliance.com>
Sent: Thursday, September 29, 2022 4:34 PM
To: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>
Cc: Vicki Grover <vicki.grover@ci.bremerton.wa.us>; Ho, John <HoJohn@wsdot.wa.gov>
Subject: [EXTERNAL] RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits

WARNING: This email originated from outside of WSDOT. Please use caution with links and attachments.

Hi Rich,

We haven't discussed it much yet. Would it be possible to provide a "not to exceed" height for railing so we can add it as a design parameter should the 12' sidewalk (10' clear width) be advanced? I do know we are not planning for any exceptionally high fencing.

Aaron Knight, PE

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Project Manager

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Aaron,

As Greg states below, 12' is really pushing the limit. Assurance that the A-62 will deploy over both Alternates (attached) will depend on the railing configuration. Have you settled on a rail design?

Rich Zeldenrust

From: Seipel, Greg <SeipelG@wsdot.wa.gov>
Sent: Thursday, September 29, 2022 3:59 PM
To: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>
Subject: RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits

The 11'-12' I am referring to is the curb to outside edge of structure. We have some tricks we can use to push the envelope, but not in every case, and not by much. The actual passable walkway depends on the rail design

From: Zeldenrust, Richard <ZeldenR@wsdot.wa.gov>
Sent: Thursday, September 29, 2022 3:25 PM

To: Seipel, Greg <SeipelG@wsdot.wa.gov>

Subject: SR 303 Warren Avenue Bridge; A-62 Reach Limits

Greg,

Figure 2.3.11-1 in the BDM shows that an A-62 is capable of reaching out over an 11'-0" sidewalk (curb line to edge of structure). Your e-mail from yesterday says that the A-62 over-sidewalk reach can be as far as 12', assuming modest railing height.

The City of Bremerton folks are asking for assurance that the A-62 will work for both Alternate Deck Configurations shown in the attachment.

Please let me know,

Rich Zeldenrust

FW: SR 303 Warren Avenue Bridge; A-62 Reach Limits

Aaron Knight <aaron.knight@scjalliance.com>
To: Jessica Soward <jessicas@sargentengineers.com>

Thu, Mar 16, 2023 at 4:44 PM

----- Forwarded message -----

From: **Zeldenrust, Richard** <ZeldenR@wsdot.wa.gov>
Date: Tue, Oct 18, 2022 at 9:26 AM
Subject: RE: [EXTERNAL] RE: SR 303 Warren Avenue Bridge; A-62 Reach Limits
To: Aaron Knight <aaron.knight@scjalliance.com>
Cc: Vicki Grover <vicki.grover@ci.bremerton.wa.us>

Aaron,

Speaking again with our Inspectors, and with the UBIT Drivers, our current A-62 UBIT Trucks will be able to reach out over a 12'-0" wide sidewalk (total width from curb outside edge of sidewalk) as long as the railing along the outside edge does not exceed 5'-0" height above the roadway surface at curb line. Our 54" bicycle rail height should be fine, but any sort of a Deterrence Fence would not be possible.

Richard Zeldenrust P.E. S.E.

Structural Design Unit Supervisor

WSDOT Bridge and Structures Office

7345 Linderson Way SW

Tumwater, WA 98501

Desk: 360.705.7196



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Aaron Knight, PE
SCJ Alliance
Associate Principal

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A62T Flight Path for sidewalk widening project

Greg DeBilzan <GregDeBilzan@aspnaerials.com>
To: Jessica Soward <jessicas@sargentengineers.com>

Wed, Mar 8, 2023 at 5:02 AM

Morning Jessica

Our engineering department has confirmed that our A-62T will clear 17' with Boom-1 at 0°. I hope this helps.

Greg DeBilzan

Aspen Aerials, Inc.

Direct: 612-414-9841



From: Jessica Soward <jessicas@sargentengineers.com>
Sent: Monday, March 6, 2023 12:34 PM
To: Greg DeBilzan <GregDeBilzan@aspnaerials.com>
Subject: A62T Flight Path for sidewalk widening project

CAUTION: This message was sent from an **External Source**. Please use proper judgment and caution when opening attachments, clicking links, or responding to this email.

Hi Greg,

I have attached a cross section of the existing bridge and the proposed sidewalk, with a few notes to help describe what I'm looking for. When I scale the A62T flight path from the website, it appears boom 2 may not clear the edge of the bridge deck. I'd like to get a higher level of confidence somehow.

Let me know if you have any questions. I greatly appreciate your help on this.

Thanks - Jessica

Jessica Soward, PE, SE | Principal

Sargent Engineers, Inc.

Direct (360) 302-7980 | Office (360) 867-9284 Ext. 7980

[320 Ronlee Ln NW | Olympia, WA 98502](#)

jessicas@sargentengineers.com