Bradley F. Shamla
Vice President, U.S. Operations
Liquids Pipelines

tel 952 607 3430
cell 218 269 5458
fax 713 821 9938
brad.shamla@enbridge.com

Enbridge Energy Company, Inc.
Enbridge (U.S.), Inc.
Minneapolis Office
7701 France Avenue South
Suite 600
Edina, MN 55435

March 31, 2017

The Honorable Bill Schuette
Attorney General
State of Michigan
Department of Attorney General
G. Mennen Williams Building, 7th Floor
525 W. Ottawa Street
Lansing, Michigan 48909

Ms. C. Heidi Grether
Director
Michigan Department of Environmental Quality
Constitution Hall
525 West Allegan Street
Lansing, MI 48933

Mr. Keith Creagh
Director
Michigan Department of Natural Resources
Executive Division
525 West Allegan Street
Lansing, MI 48933

Re: Response to Request for Information Regarding Line 5 Dual Pipelines at the Straits of Mackinac

Dear Attorney General Schuette, Director Grether and Director Creagh:

This letter and information are supplemental to the Enbridge response submitted on March 29, 2017 in response to the Request for Information transmitted to Enbridge dated March 8, 2017.

Enbridge's March 29, 2017 cover letter included a typographical error. This error is identified and corrected below:

Original Text:

- 2015 Acoustic Emission Inspection (East Straits); and

- 2015 Acoustic Emission Inspection (West Straits)

Corrected Text:

- 2016 PureHM SmartBall Inspection (East Straits); and
- 2016 PureHM SmartBall Inspection (West Straits)

[redacted]

As referenced in the transmittal sent with the hard drives there were two reports referenced in our cover letter that were not contained on the hard drives. These reports are attached to this communication.

- 2016 PureHM SmartBall Inspection (East Straits); and
- 2016 PureHM SmartBall Inspection (West Straits)

We look forward to any comments or questions you might have regarding the Responses.

Sincerely,

ENBRIDGE ENERGY, LIMITED PARTNERSHIP
By Enbridge Pipelines (Lakehead) LLC
Its General Partner

Bradley F. Shamla
Vice President, U.S. Operations

Enclosures

cc: Teresa Seidel, Division Chief, Department of Environmental Quality – WRD
Valerie Brader, Executive Director, Michigan Agency for Energy



2016 Straits of Mackinac Pipeline Inspections and Maintenance Project

Enbridge Energy
Superior, WI

Date: 1/3/2017

Prepared By:
Ballard Marine Construction, Inc.
Chris Bauer
Chris.Bauer@BallardMC.com
866.762.6750

BALLARD MARINE CONSTRUCTION

www.BallardMC.com

January 3, 2017

James Lawson
Enbridge Energy
1320 Grand Avenue, Second Floor
Superior, WI 54880-1726
(715) 398-4880 Office
(715) 394-1405 Fax
(715) 817-8449 Cell
James.Lawson@enbridge.com

Re: 2016 Straits of Mackinac Pipeline Inspection & Maintenance Project

Dear Mr. Lawson,

Attached you will find the job overview report. This report will contain detailed information from the Enbridge Energy, Limited Partnership (Enbridge Energy) Straits of Mackinac pipeline inspection and maintenance project and is designed to meet the requirements of ¶68(e) of the proposed Consent Decree with the U.S. Government to which Enbridge Energy is a party. Included with this report is an excel spreadsheet detailing the current span information and anchor locations based on the 2016 inspection and maintenance work.

Autonomous Underwater Vehicle (AUV) data collection services took place between June 3, 2016 and June 11, 2016. Remotely Operated Vehicle (ROV) and video inspection services took place June 13, 2016 – June 14, 2016. Initial data review and submittal of the current span information was provided on July 22, 2016. Diving remediation & maintenance services began with the mobilization of dive equipment on August 23, 2016 with a tentative planned start date for anchor installation of August 29, 2016. After mobilization was completed on August 28, 2016, dive operations were put on standby pending permits until October 29, 2016. Upon receiving the permits, the barge was pushed to the Mackinaw State Dock to begin Anchor installation operations which took place on November 3, 2016 and November 5, 2016. The barge was then pushed back to Cheboygan for Demobilization on November 6, 2016
Thank you for allowing Ballard Marine Construction, Inc. (BMC) to perform the services stated above. If there are any questions, please don't hesitate to contact me by which means you deem necessary.

Sincerely,

Chris Bauer
Sr. Project/Operations Manager
Ballard Marine Construction
2395 American Drive
Neenah, WI 54956
(360) 844-6868 Office
(920) 257-9938 Cell
chris.bauer@ballardmc.com



Project Overview

BMC was retained by Enbridge Energy Inc. to inspect and maintain the east and west, 20 inch diameter, steel pipelines which cross the Straits of Mackinac near Mackinaw City, Michigan. These two pipelines, located in water depths that range from 0 to 260 Feet of Fresh Water (FFW), run parallel to each other and are separated by approximately 1200 feet along the 4.6-mile length of the crossing. Both lines are buried from the shoreline extending out to water depths between 66 and 69 ft.



The focus of this project was to inspect, identify existing conditions and remediate any conditions which may not meet the easement requirements of the Straits of Mackinac crossing or could potentially compromise the safety of the pipelines. Examples of these conditions could include but are not limited to; uncovered or unsupported areas of pipeline, items such as fish traps or cable lying on or next to the pipeline or other items that may be of concern. Past surveys and historical data have showed that intermittent areas of uncovered pipeline have become unsupported along the crossing.

AUV inspection services mobilized to Mackinaw City on June 1, 2016, while ROV inspection services mobilized on June 12, 2016 and diving services mobilized on August 23, 2016. All services were de-mobilized from the project by November 6, 2016. Inspection services were conducted with a combination AUV, ROV method that included Multi-beam and Side-Scan survey systems, acoustical tracking system and video recording devices. After an initial review of the data, four spans were identified as having exceeded 75 ft. in length, and an additional 18 anchor locations were identified for preventative maintenance with a permit initially sought for all these locations. As such, BMC initially was requested to install mechanical supports at these 22 anchor locations. Issues of permitting reduced the scope to only the four spans which were identified as having exceeded 75 ft. in length. The attached spreadsheet contains updated results completed after BMC's initial review. It is BMC's understanding that Enbridge Energy will be renewing its request in 2017 for permits allowing for installation of additional anchors. BMC is prepared to install additional anchors as directed once final locations have been selected.

Operations

BMC completed mobilization of the AUV and ROV inspection vessel at the Mackinaw City Dock. From the Mackinaw City dock, the inspection vessel would mobilize to the work site where BMC went through a series of equipment calibration procedures to insure accurate data collection.

AUV inspections and data collection began on June 3, 2016 and were completed on June 11, 2016. ROV inspections and data collection began on June 13, 2016 and were completed on June 14, 2016. After data review, BMC supplied Enbridge with a spreadsheet outlining current span information on July 22, 2016. Diving operations barge and equipment began mobilization at Durocher Marine's yard in Cheboygan on August 23, 2016 and then put on standby pending permitting. On October 30, 2016, mobilization of the primary tug and diving operations barge to the Mackinaw City dock occurred, where the vessels would dock for the project. From Mackinaw City, the diving operations barge, equipment and personnel would mobilize to address the spans longer than 75 feet along Enbridge Energy's east and west crude oil pipelines crossing the Straits of Mackinac. BMC provided the navigation, positioning and diving operations while Durocher Marine provided the tug boats, inspection and diving barges, anchors and a crane.

The selection of the spans for installing anchor supports was determined by Enbridge based on the inspection results supplied by BMC. The BMC supplied inspection results were based on a review of the AUV and ROV survey and video data collected prior to diving operations. After this review it was determined that four unsupported spans of pipeline, that exceeded 75' in length, would be targeted for anchor support installation.

The four spans where anchor supports were installed in November 2016 are as follows; W-69, W-53A, W-5 & E-39. The installation of all four anchor supports was performed while crude oil was flowing in the pipelines.

After the initial review, four anchor supports and another additional 18 anchor supports were targeted for installation. These additional supports were to be installed as a preventative measure. Preventative anchor supports were determined through discussions between BMC and Enbridge and by use of the following criteria as a guideline;

- Span length in excess of 65'
- Span length history indicating that a span had previously been in excess of 75'
- Span length history showing significant growth when compared against the previous inspection
- Limited amount of length in a touchdown point between two spans, i.e. less than five feet such that if this touchdown support area were to be removed the result would be the merger of two smaller spans becoming one larger span
- Grout bags (previous repair) being used as touchdown point
- Anchors also to be added at a pre-existing engineering bend in one of the pipelines

Survey/Inspections Summary of Methods / Equipment Limitations

Autonomous Underwater Vehicle –Kongsberg "Munin" & Remotely Operated Vehicle – SeaBotix "vLBV 950"

The Kongsberg Munin Autonomous Underwater Vehicle (AUV) was utilized to collect Multi-Beam and Side-Scan Survey Data. The technicians are able to preprogram mission topside for the AUV to carry out underwater after it is deployed. Through these missions the technicians are able to communicate with the vehicle to insure proper operations. Once a mission is complete the technicians are able to download the collected data of the AUV before redeployment for the next mission. Because the AUV is a free flying vehicle, weather constraints are minimal. In addition, because the AUV can collect multi-beam data within a couple of meters of the pipeline, these factors make this a more versatile and useful data collection system than traditional topside survey data collection methods.

For the AUV inspection, the vehicle was equipped with a multi-bean system, side-scan system and internal positioning systems that included Global Positioning System (GPS), Inertial Navigation System (INS) and Doppler Velocity Logger (DVL) systems. AUV technicians were then able to deploy the vehicle for data collection of the pipeline, recover the vehicle to collect data and then redeploy for additional data collection. Two separate missions were run on each pipeline to insure accurate and ample data collection. The limitations for this equipment are minimal. This is what makes this vehicle such a beneficial tool. Because the AUV is free flying and not dependent on top side support during operations weather is not a large factor.

The "vLBV 950" is a Remotely Operated Vehicle (ROV) system and is an extremely versatile ROV system. It can be employed to carry out a variety of tasks including surveying, searching and inspections. A pilot on the surface controls the vehicle remotely by sending commands to the vehicle tether. The vehicle can be moved in any direction, or by using the autopilot facility, remain accurately on course and depth to provide a stable platform. The pilot can also control the vehicle's video system, lighting and any other equipment fitted to the unit.

For the ROV inspection, the vehicle was fitted with a Linkquest USBL tracking system in concert with an RTK GPS system and Hypack software. In operations, the ROV was fitted with a Linkquest acoustic transponder, which sends out a sound signal to be picked up by a hydrophone mounted on the side of the surface support vessel. The offsets of the vehicle as calculated by Hypack, is fed to the navigation computer that plots a corresponding XY position based on Real Time Kinematics (RTK) information from the GPS. Video from the on-board camera is recorded in a digital format, with the surveyor following position information from the Hypack navigational software.

In operation, the vessel is positioned over the pipeline using a live boat operation for the survey. With evidence of a strong fixed RTK lock as well as a solid return from the vehicle tracking system, the vehicle is launched from the surface to begin its descent to the bottom. Once on bottom, the operator utilizes the navigation system to guide the vehicle to the pipeline. With the pilot free to fly the vehicle, the survey supervisor takes notes with further direction given by the client representative on site. Different from years past, the ROV inspection services were used only to obtain video of the pipelines to look for visual anomalies, coating delamination, obstructions or items endangering the pipeline and inspections of previously installed anchors. 2014 was the first year that an AUV was used to collect all position information on the pipeline

The main limitations for ROV operations are typically related to water clarity (visibility), water current, surface weather and wave conditions. In highly turbid water conditions, an acceptable video record is impossible to generate. Fortunately water clarity for this project was exceptional, allowing for a very clear video record. Water velocities (currents) can sometimes pose difficulties in keeping the vehicle on station, or even getting it to the target. At times stronger currents (2-3ft/sec) hampered dive operations but never became a problem during survey operations

The most prevalent limitation of this equipment is imposed by weather conditions. High winds/waves make for difficulties in launch and recovery of the equipment. Throughout the survey period weather was ideal, however during dive operations weather played a large role and weather downtime was incurred.

Equipment Overview (Inspection Operations)

BMC mobilized the AUV, ROV, Hydrographic survey vessel and additional equipment from at the Mackinaw City, MI State Dock for the inspection. This package consisted of the following:

- Kongsberg Munin – Autonomous Underwater Vehicle with all associated equipment
  - EM 204 Multi-beam system
  - EdgeTech Side-Scan Sonar System
  - Doppler Velocity Logger (DVL)
  - Inertial Navigation System (INS)
  - Global Positioning System (GPS)
  - Forward Looking Sonar System
  - Depth Sensor
  - Long Base Line (LBL) acoustic tracking system
- ROV LARS – Launch and Recovery System
- vLBV 950 - Remotely Operated Vehicle with all associated equipment
  - 2- Camera (1 Black and White and 1 Color)
  - Tilt Unit
  - Lighting
  - Compass
  - Depth Sensor
- Comprehensive field spares kit
- Linkquest tracking, Ultra short base line acoustic tracking system
- Trimble SPS 461 Heading
- Motion Reference Unit (MRU)
- Trimble R5-R6 GPS System - Real Time Kinematics (RTK) (centimeter accuracy)
- Computer navigation system
- Computerized and digital video recording equipment
- Offshore safety package
- Hydrographic Survey Vessel (Miss Geodesy)
- Hypack Hydrographic Survey Software

Diving Operation and Equipment

The project manager is in contact with immediate personnel on treatment gas stores, equipment and equipment start-up. In turn, the tug boat captain is in contact with the USCG for shipping traffic concerns, weather reports and will report this information to the project manager. At this point, the project manager and client representative will make the determination of that day's project location and a decision to sail.

Span coordinates identified from the 2016 AUV survey were used to plot anchor supports and mooring anchor locations. The barge was then positioned over anchor locations identified by the Hypack navigation system. The Hypack navigation program, located on the barge, brings in information provided from the RTK GPS, Heading Sensor, Motion Reference Unit (MRU) and Link-quest tracking system, which is then relayed to a monitor on the tug for the tug captain to follow. The mooring anchors are then dropped approximately 750' from the pipeline and anywhere between 1,000'-2,200' apart. Once both anchors are in position (2 anchor spread off the stern of the barge) the barge was towed into position and held in place with a constant speed and heading from the tugboat.

The vLBV 950 ROV was launched and the span is again inspected so that the final anchor support location can be determined. Locations were selected based on their proximity to the center of the span or as discussed with Enbridge's on site representative, type of bottom encountered (smooth or irregular, hardness) and span height.

The dive bell was then lowered to the work site, guided by the ROV. Adjustments were then made for barge positioning. When positioning of the barge was finished, guided by the remotely operated vehicle, the hydraulic drilling tool was then lowered to the work area and held by the crane. When the barge position was stable, the crane operator, by use of the live video supplied by the ROV, would begin lowering the tool into position and capture the pipeline. Next, the dive supervisor would begin the drilling process via controls located topside. Once drilling was complete a diver would enter the water to detach the tool from the anchor assemble and complete final installation.

The screw anchor and saddle support, which is a prefabricated design, is designed to drill along both sides of the pipeline simultaneously. Extensions can be added, for adjustment with sub-bottom material or span height. When drilling anchor supports into the sub-bottom, a minimum torque value must be met. At that time, the upper and lower saddle supports were installed. Placing the support over and under the pipeline and then all-thread bolts bring all the support saddles together.

Dive operation begins and bottom time starts when the diver leaves the surface. Once on bottom, the diver removes the 3-pin assembly thus disconnecting the hydraulic tool from the anchor assembly. The tool is then lifted off the screw assembly and safely placed off the East Side of the pipeline to prevent dragging back into the pipe. The diver then assembles the anchor and saddle into place until installation is completed.

The final inspection and position of the pipeline anchor supports were recorded from the ROV and the diver is brought to the surface for decompression if needed.

Equipment Overview (Diving Operations)

The following equipment was mobilized to Durocher Marine's yard in Cheboygan, MI for setup on barges:

- Mixed gas control Trailer
- 3 – 54" deck decompression chambers
- 4 – Hot water machines
- 3 – Quincy 5120 diver's air compressors
- 150kw Multi-quip generator
- 2 - Class 2 diving bell and Man Rated Handling system
- Hydraulic drilling tool
- 2 – Hydraulic hose reels
- 2 – Underwater video and lighting systems
- vLBV 950 - Remotely Operated Vehicle with all equipment and spares (Inspection Class)
- Link Quest tracking Plus tracking system with 4 beacons
- 2 - Hypack navigation computers
- Trimble R5/R6 RTK GPS
- Trimble SPS 461Heading
- 2 – 600' Diver's umbilical's
- Mixed gas stores
    - 100% Oxygen (Decompression gas)
    - 8416 HeO2 (Bottom mix)
    - 8614 HeO2 (Bottom mix, emergency gas)
    - 6040 HeO2 (Decompression gas)
    - 6040 Nitrox (Treatment gas)
- Miscellaneous diving and construction equipment (hoses, extension cords, tools, etc.)
- Helical Screw Anchors and Supports

- Due to space and weather considerations, the above equipment was setup in storage containers and sea fastened to the barge. The Hypack navigation equipment was centralized in the dive container, tracking the barge heading and position, ROV position, bell position and anchor drilling tool position. With the primary navigation being controlled from the dive container, a monitor was installed in the tug boat for navigation.

Findings

Data obtained during the 2016 AUV and ROV survey inspection were found to be similar to past findings, including the data obtained during the 2014 survey and inspection. Both the east and west pipelines show intermittent suspension over their entire length of uncovered pipeline. Four spans were determined to have exceeded the 75' span length requiring mitigation. Grout bags that were previously used (pre-anchor support design) for span repair were noted on the east and west lines, and at most of these locations the pipeline no longer rested on top of these grout bags. Currently only three grout bag locations still made contact with the bottom of the pipeline and were still considered to be touchdown points. These 3 locations were included in the 18 locations for which permits were sought. Mechanical anchor supports installed during previous mitigation programs were found to be stable and in good condition. A few instances of a small amount of coating delamination were observed. Additionally, areas of small debris encroachment were noted but nothing of concern was observed.

The enclosed spreadsheet identifying requested span information is also included within this report. This spreadsheet identifies span identifiers, location of all spans, current span lengths, span touchdown point information including depth and bottom type.

Conclusions

Upon the completion of the AUV and ROV inspection and data review process, Enbridge Energy, with support from Ballard Marine Construction, made the determination that four spans exceeded the 75' length and required anchor supports. In addition, another 18 preventative anchor supports would also be installed. The timing for install of the anchors will be such to ensure that the pipeline will have crude flowing through the line during anchor installation which is consistent with the 2014 remediation program.

Enbridge Energy received the permits required to install the four anchor supports required to eliminate spans exceeding 75 feet, and these supports were installed during the 2016 mitigation campaign. As a result of the installation of these four anchor supports, BMC has concluded (as of November 5th, 2016) that there are no longer spans exceeding 75' in length for either the east or west legs of Enbridge Energy's line 5 crossing the Straits of Mackinac. Furthermore, the ROV video inspection and AUV data collection shows that the pipeline currently appears to be in stable condition with minimal coating delamination or nearby obstruction concerns.

Lastly and subject to permitting, BMC understands that additional preventative anchor supports will be installed in 2017.

Geotechnical
Environmental
Water Resources
Ecological

GEI Consultants

GEI TECHNICAL MEMORANDUM

To: Shane Yokom, Enbridge
119 North 25th Street East
Superior, Wisconsin 54880

From: Stu Kogge, PWS, Sr. Wetland/Aquatic Biologist, GEI Consultants of Michigan, P.C. (GEI), Traverse City, Michigan

Date: July 29, 2016

Re: Enbridge Line 5 Visual Biota Survey of Straits of Mackinac Crossing

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Purpose

The purpose of this document is to provide a summary of the 2016 visual biota survey of the dual pipelines (Line 5) crossing the Straits of Mackinac. Where possible, or where strong correlations exist, identification of aquatic biota and their densities as they relate to water depth are provided.

Background

In 2014, a technical memorandum (Kogge and De Jong, 2014) was prepared to provide a literature review of aquatic biota expected to attach to submerged pipes within the Great Lakes, with an emphasis on (1) how the biota was attaching to the pipes, (2) what was the effect of these attachments, (3) repellants or mechanical means of preventing attachment to pipes, and (4) other pertinent information on these aquatic biota.

Kogge and De Jong, 2014 also presented an analysis of samples taken from the submerged pipes under the Straits, including a piece of pipe coating containing mussels. This technical memorandum also provided information on how this biota, quagga mussels (*Dreissena rostriformis bugensis*), were attaching to the pipe, what was the composition of their attachment mechanisms, and whether these were, or could have an adverse impact on the pipe coatings. The technical memorandum summarized these items and suggested that the byssal threads connecting the mussels to the pipe coatings, consisting of various proteins, showed no visual adverse impact to the coating material.

Visual Biota Survey

A remote operated vehicle was used to conduct a visual inspection of the 20-inch diameter dual pipelines of Line 5 on June 13-16, 2016. The video footage from the inspection was reviewed to survey the biota. A summary of the observations from the survey are provided below:

- Similar biota were observed on both pipelines; therefore, all observations are representative of both pipelines.

- The inspection video limits the ability to positively identify the numerous algae, macrophytes, and overall composition of periphyton that surround and have attached to the pipelines at various locations across the Straits. The algae appear to include filamentous green algaes, muskgrass (*Chara spp.*), and Cladophora (*Cladophora spp.*). The macrophytes appear to contain plants from within the Potamogetonaceae family. However, positive identification to the species level will require collection of samples for examination.

- Similarly, positive identification of mussels from the inspection video was not possible. However, the results of the 2014 sampling event presented in Kogge and De Jong, 2014, suggest that the mussel populations consist primarily of quagga mussels. The mussels found on the pipes in the deeper water areas, in excess of 100 feet, are most likely all quagga mussels while the shallower areas may contain a small percent of zebra mussels. The dreissinid mussel populations in the Great Lakes have shifted to a community dominated by quagga mussels (Mills et al. 1996, 1999; Wilson et al. 2006). The quagga mussel also apparently has a much greater tolerance for water depth, even though other ecological requirements are similar between the two species (Mills et al. 1996; Matthews et al. 2012). The zebra mussel also rarely outcompetes the quagga mussel (Zhulidov et al. 2013).

  Mussel densities appeared to increase with increasing depth. Visual observations suggest that the mussels are primarily attaching in a single layer and not accumulating in multiple layers.
- Periphyton was observed on the pipes at all water depths with the greatest densities in the relatively shallower water areas from where the pipe emerges from the lake floor to approximately 75 feet. Periphyton refers to the total assemblage and wide array of aquatic organisms that are found sessile or attached to other aquatic biota or the dual pipelines, and which consists of algae, bacteria, fungi, protozoa, phytoplankton, zooplankton, organic detritus, benthic organisms, and other invertebrates and their larvae (Azim 2005). While these microscopic organisms cannot be identified to the species or lower taxonomic levels, they can be collectively termed periphyton for the purposes of this summary.

- Within both the northern and southern shallow water zones, the exposed dual pipelines were often blanketed with a mixture of submergent aquatic vegetation, algae, periphyton, and mussels. As the dual pipelines extend into deeper water, the density of filamentous algae and macrophytes diminished, and the density of mussels increased. Based upon review of video footage, this approximate "break point/depth" occurred at the approximate 100 to 120 foot depths. This would be expected since these water depths (from approximately 19-31 meters or approximately 60 to 100 foot depths) would still be within an expected euphotic zone for Lake Michigan (Lake Access 2016).

- At water depths in excess of 120 feet, mussels were abundant along with a less dense layering of periphyton. At water depths in excess of 200 feet, periphyton was minimal and mussels remained abundant. At depths below 200 feet, greater concentrations of apparently empty mussel shells were observed on the dual pipelines and on the bottom substrates.

- Round gobies (*Neogobius melanostomus*) were commonly seen at all water depths with exception of the deepest depths (over 200 feet). However they may have been present but just not detectable due to poorer visibility at those depths; this species preys heavily on zebra and quagga mussels.

Literature Cited

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Matthews, J., G. van der Velde, A. bij de Vaate, and R. S. E. W. Leiven. 2012. *Key Factors for Spread, Impact and Management of Quagga Mussels in the Netherlands.* Radboud University Nijmegen, the Netherlands.

Mills, E. L., G. Rosenberg, A. P. Spidle, M. Ludyanskiy, Y. Pligin, and B. May. 1996. A review of the biology and ecology of the quagga mussel (*Dreissena bugensis*), a second species of freshwater dreissenid introduced to North America. *American Zoologist* 36: 271-286.

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Zhulidov, A. V., A. V. Kozhara, T. F. Nalepa, T. Y. Gurtovaya, and D. A. Zhulidov. 2013. Relative abundance of two dreissenid species, *Dreissena polymorpha* and *Dreissena rostriformis bugensis* in the Lower Don River system, Russia. *Aquatic Invasions* 8: 311-318.

William T. Hassler
202 429 6469
whassler@steptoe.com

1330 Connecticut Avenue, NW
Washington, DC 20036-1795
202 429 3000 main
www.steptoe.com

Steptoe
STEPTOE & JOHNSON LLP

January 4, 2017

VIA EMAIL

Leslie A. Kirby-Miles
U.S. EPA, Region 5
Office of Regional Counsel (C-14J)
77 W. Jackson Blvd.
Chicago, IL 60604

Ann Whelan
U.S. EPA, Region 5 (SE-5J)
Superfund Division
77 W. Jackson Blvd.
Chicago, IL 60604

Ellen Riley
U.S. EPA, Region 5 (SC-5J)
Superfund Division
77 W. Jackson Blvd.
Chicago, IL 60604

Cheryl T. Rose
U.S. EPA
Office of Enforcement and Compliance
Mail Code 2243-A
1200 Pennsylvania Ave., NW
Washington, DC 20460

Re: ***United States v. Enbridge Energy, Limited Partnership, et al.*, Civ. No. 1:16-cv-00914, Proposed Consent Decree [ECF No. 3] – Submittal of Reports Required by Paragraph 68.e of the Proposed Consent Decree**

Dear Ms. Kirby-Miles, Ms. Whelan, Ms. Riley and Ms. Rose:

On behalf of the Enbridge parties ("Enbridge"), please find attached (1) a report prepared by Ballard Marine Construction ("BMC") summarizing the findings of the visual inspection of the Line 5 Dual Pipelines conducted for Enbridge in the Straits of Mackinac in 2016 and the repair work done following the inspection and (2) a report prepared by GEI Consultants ("GEI") summarizing the findings of the biota survey of the Dual Pipelines that the firm conducted for Enbridge based on the visual inspection conducted by BMC. These reports are being submitted as provided in ¶ 68.e of the proposed Consent Decree.

BMC conducted a visual inspection of the portion of Line 5 that crosses the Straits in June 2016 and the results were analyzed in July 2016. The attached BMC report explains how the inspection was conducted and summarizes the findings of the inspection.

Steptoe
STEPTOE & JOHNSON LLP

Following the inspection, Enbridge filed applications with the Army Corps of Engineers ("Corps") and the Michigan Department of Environmental Quality ("MDEQ") to install screw anchors at a total of twenty-two locations to add support to spans identified in the BMC report. MDEQ issued permits for four of those locations and four anchors were successfully installed, as reported to you in the letter dated November 9, 2016.[1] The installation of the anchors at these four locations eliminates any unsupported spans greater than 75 feet long.

Based on the results of the 2016 visual inspection Enbridge plans to seek permits from the Corps and MDEQ for the installation of additional anchors in 2017 to address locations for which additional support is deemed appropriate. Proposed criteria for identifying additional locations are contained in the attached BMC report.

Attached to the BMC report is a spreadsheet that reflects updated data provided by BMC since the parties last spoke. Column L to the spreadsheet (entitled "Touch Down Position and Type (Year Install)") characterizes various touchdown positions as either "clay" or "sand". These characterizations are preliminary in nature and subject to possible revision following additional review or inspection.

The attached GEI report describes a survey of biota undertaken based on the visual inspection made of the Dual Pipelines. As you know a biota inspection plan, currently pending approval by EPA, was submitted to your offices by Enbridge on September 27, 2016 as per ¶ 69b of the proposed Consent Decree. That plan is based in part on the attached GEI biota survey report, which is referenced in the inspection plan.

Please let us know if you have any questions regarding the attached.

Sincerely,

William T. Hassler
David H. Coburn
Attorneys for Enbridge

Enclosures
cc: Steven Willey, U.S. Department of Justice
Joseph Warren, U.S. Department of Justice
Thomas Van Horn, U.S. Coast Guard
eescdcopy.enrd@usdoj.gov

[1] By letters dated August 10, 2016, September 8, 2016, September 16, 2016, October 5, 2016, October 20, 2016 and November 9, 2016, Enbridge advised the Department and EPA of its progress with respect to the inspection, permitting and repairs.

SUPPLEMENT TO BIOTA WORK PLAN

This submission supplements the Biota Investigation Work Plan originally submitted on September 27, 2016.

The dual pipelines that cross the Straits are protected by multiple layers of coating. These layers include a primer coat, a layer of enamel, and two layers (inner and outer) of glass fiber wrap. The portion of the coating system that protects against corrosion after installation of a pipeline is the enamel layer below the inner and outer wraps.

The proposed Consent Decree directs that Enbridge assess whether the accumulation of mussels and other biota have impacted the integrity of the pipelines' coating or the underlying metal, including areas where there are openings or "holidays" in the pipeline coating. See ¶ 69.a. The September 27 Work Plan reflected this requirement, and listed assessment of whether biota have impacted the integrity of the lines' coating in areas where there may be openings in the pipeline coating. See Work Plan, § 2.0 (summarizing Consent Decree requirements). References relating to assessment of openings/holidays are included in numerous sections of the Work Plan.[1]

Figures 4 and 5 of the Work Plan identify 18 specific anomalies in the coating that may represent holidays on the dual pipelines – 11 on the East Pipeline and 7 on the West Pipeline. Section 3.3.3.2 of the Work Plan provides that locations with possible coating anomalies will be targeted for investigation, and describes the methodology to be used for further investigation. The 18 areas originally subject to investigation included (i) areas where based on the visual inspection the outer wrap of the coating appears to have been dislodged; and (ii) areas where biota does not appear to be present on the pipe (but would normally be expected to be present).

Information in the 2016 Work Plan is based on work done by Ballard Marine Construction (BMC), the company that conducted the 2016 visual inspection of the dual pipelines. BMC has conducted additional review of the 18 areas identified in the Biota Plan and has determined that there is no evidence of "bare metal" exposed on either pipeline in any of the areas. Attached to this Supplement are photographs reviewed by BMC in reaching this conclusion. The photographs show all 18 areas identified in Figures 4 and 5. Enbridge intends to inspect all 18 locations, as per the 2016 Work Plan, in order to gather any relevant additional data about these areas.

In addition, Enbridge now plans to assess 14 additional locations where there is a visible disturbance in the biota on the pipeline. While Enbridge does not believe that these areas pose

[1] The following sections of the Work Plan contain references to holidays or potential holidays: § 3.2 (Study Areas); § 3.3.3.1 to .3 (U/W Survey, Holidays and Additional Sampling); § 3.3.4 and 3.3.4.1 (Pipe Integrity Readings and Cathodic Protection Evaluation); and § 4.0 and 4.2 (Sample and Lab Analysis and Presence/Absence Bacteria Testing). See also Figure 8 (holiday area sampling layout) and Table 2 (Holiday area sample sites: East and West pipelines).

any threat to the integrity of the Lines, it plans to conduct these additional assessments to determine whether or not any of the disturbances represent areas of potential damage to the outer fiber wrap, or, alternatively, are unrelated to the coating on the lines. These 14 additional locations are intended to be a representative sample of areas on the Dual Lines where biota appear to have been disturbed.

Enbridge also now plans to investigate an additional 3 locations that have previously been assessed for coating damage in connection with prior inspections to confirm the integrity of the pipelines at these locations. Two of the three locations are located on the east line near the E-72 and E-74 locations (45.79914358N 84.76763678W & 45.79836501N 84.76791355W) and the third is located on the west line near the W-68A location (45.817385N 84.76571649W).

In summary, under the Supplemental Work Plan now proposed assessments will be conducted at 35 locations (the 18 identified in the September 27 Work Plan, and the 17 additional locations identified here). These assessments will represent approximately 34% of the areas showing disturbances in biota. The proposed number of additional sample locations was selected to provide at least a 90% confidence level in detecting any coating anomalies that may relate to disturbances in biota.

The attached photographs generally show areas of the pipelines in which biota are not present or are only minimally present. As discussed above, it is not clear at this time whether these locations reflect areas where the outer wrap of the coating is no longer in place or whether these locations reflect areas that simply are lacking biota. Enbridge provided EPA on March 20, 2017, a copy of the video recording of the 2016 visual inspection, from which the attached photographs were obtained. Enbridge is currently compiling photographs of the additional areas where biota may have been disturbed, and will provide them to EPA in the near future (probably during the week of March 27). These additional photographs are intended to facilitate EPA's review of the Work Plan.

As noted, the portion of the coating system that protects against corrosion after installation of a pipeline is the enamel layer below the inner and outer wraps. Photographs from the 2016 inspection of the dual pipelines do not show any loss of the underlying enamel coating. These observations will be subject to further review as part of the Biota Investigation Work Plan. Section 3.3.4.1 of the Work Plan (Cathodic Protection Evaluation) as submitted can be read to suggest that there may be holiday areas of exposed metal.[2] However, as noted, subsequent review of the visual data from 2016 has not shown any areas of bare metal. Implementation of the Work Plan will determine whether the current conclusion that no bare metal is exposed can be confirmed. The cathodic protection evaluation described in § 3.3.4.1 would be employed if any bare metal areas were identified.

[2] See §3.3.4.1 at page 12 ("Cathodic protection readings will be taken at each holiday area where bare metal is exposed.")

Span Identifier	2016 Length	2016 Span Height (Approximate)	2016 Support Length	2014 Length	2012 Length	2010 Length	2007 Length	2006 Length	2005 Length	Touch Down Position and Type (Year Install)	Support Depth	Notes	Anchors Proposed in 2016 (not yet installed)
South Perm Exposure Point	NA	NA	NA	NA	NA	NA	NA	NA	NA	Grey/Sand	75		
E-75	NA	NA	NA	NA	Silted In	70	69	73	80	NA	NA		
										NA	NA		
E-74A	52	0.5	236 to Southern Exposure^^	50	80	61	67	67	71	South/Sand	75		
										North/Anchor (2009)	73		
E-74B South	66	0.5	1 Shared Touch Down ^	70	56	109	100			South/Anchor (2004)	73	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2009)	74		
E-74B North	46	0.5	1 Shared Touch Down ^	47	48					South/Anchor (2010)	71		
										North/Anchor (2006)	73		
E-74C	18	1	1 Shared Touch Down ^	28	16	13	14			South/Anchor (2006)	73		
										North/Sand	72		
E-71A	36	0.5	116 to E-74C^	30	76	87	86	86	84	South/Sand	71		
										North/Anchor (2014)	73		
E-71B	47	0.5	1 Shared Touch Down ^	49						South/Anchor (2014)	71		
										North/Anchor (2003)	73		
E-72	43	0.5	1 Shared Touch Down ^	44	40	40	38	36	48	South/Anchor (2014)	75		
										North/Sand	75		
E-77	48	1	7 to E-72^	37	34	44	52	44	42	South/Sand	75		
										North/Sand	73	Ht increase but no history in excess of 52'. No other criteria meet.	
E-26	48	1	188 to E-77^	54	48	54	45	48	51	South/Clay	75		
										North/Sand	73		
E-25A	60	0.5	39 to E-26^	38	87	91	85	84	96	South/Sand	84	20' increase and a strong sediment feature existing on span, at angles in excess of 90.	
										North/Anchor (2014)	84		
E-25B	34	0.5	1 Shared Touch Down ^	48						South/Anchor (2014)	83		
										North/Sand	82		
E-24	46	0.5	107 to E-25B^	44	44	50	45	46	37	South/Sand	84		
										North/Sand	85		
E-23A South	25	0.5	95 to E-24^	28	86	85	81	86	84	South/Sand	86		
										North/Anchor (2014)	86		
E-23A North	58	0.5	1 Shared Touch Down ^	58						South/Anchor (2014)	86		
										North/Anchor (2003)	86		
E-23B South	60	0.5	1 Shared Touch Down ^	61	66	87	86	90	90	South/Anchor (2003)	90		
										North/Anchor (2012)	91		
E-23B North	32	1	1 Shared Touch Down ^	31	26					South/Anchor (2012)	92		
										North/Sand	86		
E-27	59	0.5	79 to E-23B North^	63	58	69	65	66	74	South/Sand	85		
										North/Sand	84		
E-28A South	36	1	54 to E-27^	37	70	81	73	74	81	South/Sand	86		
										North/Anchor (2014)	86		
E-28A North	34	1	1 Shared Touch Down ^	38						South/Anchor (2014)	86		
										North/Anchor (2003)	86		
E-28B	58	1	1 Shared Touch Down ^	63	66	69	65	64	72	South/Anchor (2003)	86		
										North/Sand	84		
E-29	57	1	32 to E-28B^	59	60	55	44	63	53	South/Sand	84	Long Shadow to north and south indicating [illegible] support. Signs of consistent growth.	1
										North/Sand	87		
E-30A	39	1	17 to E-29^	38	72	83	82	82	89	South/Sand	91		
										North/Anchor (2014)	89		
E-30B	38	1	1 Shared Touch Down ^	36						South/Anchor (2014)	90		
										North/Sand	85		
E-38	36	1	81 to E-30B^	36	34	45	32	37	46	South/Sand	76		
										North/Sand	73		
E-37	52	1	160 to E-38^	56	54	54	50	54	53	South/Sand	77		
										North/Sand	73		
E-36	45	0.5	17 to E-37^	50	42	41	48	42	34	South/Sand	75		
										North/Sand	75		
E-35A	32	0.5	38 to E-36^	36	60	67	66	67	63	South/Sand	76		
										North/Anchor (2014)	73		
E-35B	38	0.5	1 Shared Touch Down ^	36						South/Anchor (2014)	75		
										North/Sand	75		
E-34A	59	1	17 to E-35B^	58	58	62	54	61	59	South/Sand	80		
										North/Anchor (2003)	82		
E-34B South	51	1	1 Shared Touch Down ^	53	73	80	82	74	75	South/Anchor (2009)	82		
										North/Anchor (2014)	81		
E-34B North	26	1	1 Shared Touch Down ^	21						South/Anchor (2014)	81		
										North/Sand	82		
E-33	50	1	109 to E-34B North^	43	46	52	47	45	39	South/Sand	85		
										North/Sand	86		
E-32A-A	Silted In	NA	NA	6	Silted In	11	17			South/Clay	91		
										North/Anchor (2006)	91		
E-32A South	41	1	20 to E-33^^	40	47	92	89			South/Anchor (2009)	91		
										North/Anchor (2012)	91		
E-32A North	49	1.5	1 Shared Touch Down ^	47	40					South/Anchor (2012)	91		
										North/Anchor (2003)	91		
E-32B South	66	1	1 Shared Touch Down ^	67	88	87	97	85	79	South/Anchor (2003)	87	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2014)	86		
E-32B North	23	1	1 Shared Touch Down ^	22						South/Anchor (2014)	85		
										North/Clay	91		
										South/Clay	90		

										North/Clay	91		
E-39A	48	1	54 to E-31^	63	74	83	67	78	66	South/Clay	130		
										[redacted]	101		
E-39B	29	1	1 Shared Touch Down ^							[redacted]	131		
										North/Sand	101		
E-40A	25	1	351 to E-39B^	22	85	82	80	90	97	South/Sand	116		
										North/Anchor (2019)	107		
E-40B	66	1	1 Shared Touch Down ^	60						South/Anchor (2014)	107	excess of 65'	
										North/Sand	107		
E-46	51	1	210 to E-40B^	46	86	93	82	72	58	South/Sand	131		
										North/Anchor (2006)	107		
E-45A	60	1	1 Shared Touch Down ^	58	53	50	49	62	72	South/Anchor (2018)	107		
										North/Anchor (2034)	107		
E-45B	27	1	1 Shared Touch Down ^	28						South/Anchor (2014)	107		
										North/Clay	106		
E-44	45	1	144 to E-45B^	45	45	37	33	40	37	South/Clay	133		
										North/Clay	101		
E-43	51	1	67 to E-44^	56	54	54	59	54	54	South/Clay	116		
										North/Clay	100		
E-42 South	46	1.5	35 to E-43^	39	45	91	97	97	103	South/Clay	116		
										North/Anchor (2012)	106		
E-42 North	50	1.5	1 Shared Touch Down ^	46	52					South/Anchor (2012)	139		
										North/Clay	106		
E-41	71	1	122 to E-42 North^	71	70	74	77	68	84	South/Clay	130		
										North/Clay	101	Long shadow in south indicating little support. History of length exceeding 75'	1
E-47A	39	1	144 to E-41^	45	76	75	75	74	75	South/Clay	130		
										North/Anchor (2034)	105		
E-47B	35	1	1 Shared Touch Down ^	28						South/Anchor (2014)	103		
										North/Clay	105		
E-48A	50	1.5	18 to E-47B^	55	48	59	48	55		South/Clay	133		
										North/Anchor (2005)	105		
E-48B South	55	1	1 Shared Touch Down ^	60	67	66	82	68		South/Anchor (2015)	105		
										North/Anchor (2034)	106		
E-48B North	15	1	1 Shared Touch Down ^	14						South/Anchor (2014)	108		
										North/Clay	108		
E-79	NA	NA	NA	NA	NA	[redacted]	19	13		NA	NA		
										NA	NA		
E-70	54	1	386 to E-48B North^^	52	53	54	53	47	52	South/Clay	113		
										North/Clay	114		
E-66A South	20	1	8 to E-70^	22	22	97	89	97		South/Clay	114		
										North/Anchor (2012)	114		
E-66A North	72	0.5	1 Shared Touch Down ^	72	77					South/Anchor (2012)	116		
										North/Anchor (2005)	116	excess of 65'. No need to mitigate. Anchors on both north and south ends	
E-66B	49	1	1 Shared Touch Down ^	52	56	89	89	81		South/Anchor (2015)	116		
										North/Clay	116		
E-56A	39	1.5	39 to E-66B^	44	45	44	33			South/Clay	116		
										North/Anchor (2004)	117		
E-56B	41	2	1 Shared Touch Down ^	46	44	42	48			South/Anchor (2018)	117		
										North/Clay	116		
E-55	45	1	37 to E-56B^	46	45	46	41	50	43	South/Clay	116		
										North/Clay	117		
E-54A	58	3	16 to E-55^	57	58	62	59	66		South/Clay	117		
										North/Anchor (2005)	124		
E-54B	39	2.5	1 Shared Touch Down ^	33	32	37	39	29		South/Anchor (2005)	124		
										North/Grout Bag (2001)	125	Replace grout bag touchdown point with anchor between spans E-54B and E-54A	1
E-53A	41	3	3 Shared Grout Bags ^	44	44	38	33	43		South/Grout Bag (2001)	120		
										North/Anchor (2005)	117		
E-53B	66	3	1 Shared Touch Down ^	60	57	64	71	63		South/Anchor (2005)	117		
										North/Clay	120	excess of 65'	
E-52A	7	2.5	6 toE-53B^	10	9	15	14	18		South/Clay	130		
										North/Anchor (2012)	131		
E-52B	10	3	1 Shared Touch Down ^	8	8					South/Anchor (2012)	131		
										North/Clay	131		
E-49C	42	2	10 to E-52B^	51	48	46	36	53	44	South/Clay	132		
										North/Anchor (2004)	136		
E-49B South	49	2	1 Shared Touch Down ^	42	86	85	82	87	101	South/Anchor (2004)	136		
										North/Anchor (2034)	138		
E-49B North	47	2	1 Shared Touch Down ^	45						South/Anchor (2018)	139		
										North/Anchor (2019)	142		
E-49A South	62	1	1 Shared Touch Down ^	67	87	75	93	95	86	South/Anchor (2004)	142		
										North/Anchor (2034)	143		
E-49A North	21	1	1 Shared Touch Down ^	23						South/Anchor (2014)	143		
										North/Clay	144		
E-58	63	3	81 to E-49A North^	62'	60	51	66	61	61	South/Clay	144		
										North/Clay	142		
E-61A-A	54	3	194 to E-58^	57	52	47	59			South/Clay	140		
										North/Anchor (2004)	148		
E-61A	66	4	1 Shared Touch Down ^	63	65	61	68	120	129	South/Anchor (2004)	148		
										North/Anchor (2004)	148		
E-61B South	44	4	1 Shared Touch Down ^	46	52					South/Anchor (2004)	148		
										North/Anchor (2012)	151		
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	South/Anchor (2012)	151	[redacted]	

										North/Anchor (2004)	150		
E-61C South	53	3	1 Shared Touch Down ^	57	61	85	90	83	78	South/Anchor (2004)	150		
										North/Anchor (2012)	145		
E-61C North	28	2.5	1 Shared Touch Down ^	29	31					South/Anchor (2012)	145		
										North/Clay	142		
E-62	37	1.5	47 to E-61C North^	39	37	32	29	38	34	South/Clay	138		
										North/Clay	133		
E-63	19	1	15 to E-62^	21	18	23	22	22	15	South/Clay	132		
										North/Clay	133		
E-64	47	1	24 to E-63^	49	52	47	51	48	52	South/Clay	135		
										North/Clay	135		
E-22A	65	4	33 to E-64^	70	76	80	74	76	79	South/Clay	133	In excess of 65'	
										North/Anchor (2014)	133		
E-22B	14	1	1 Shared Touch Down ^	7						South/Anchor (2014)	133		
										North/Clay	131		
E-21	51	0.5	41 to E-22B^	53	50	43	48	52	51	South/Clay	131		
										North/Clay	132		
E-20	NA	NA	NA	NA	NA	Filled In	23	25		NA	NA		
										NA	NA		
E-19A South	23	0.5	63 to E-21^^	23	75	87	76	78	107	South/Clay	136		
										North/Anchor (2014)	139		
E-19A North	60	0.5	1 Shared Touch Down ^	60						South/Anchor (2014)	139		
										North/Anchor (2003)	143		
E-19B South	59	1	1 Shared Touch Down ^	58	82	75	80	81	73	South/Anchor (2003)	143		
										North/Anchor (2014)	147		
E-19B North	22	0.5	1 Shared Touch Down ^	24						South/Anchor (2014)	147		
										North/Clay	148		
E-18B	27	0.5	35 to E-19B North^	22	23	25	22	25	16	South/Clay	161	Small mudflat exists between E-18A, E-18C & E-18B. Merger would not create span in	
										North/Clay	154	excess of 65	
E-18C	8	0.5	3 to E-18B^	15	Silted In	16				South/Clay	154	Small mudflat exists between E-18A, E-18C & E-18B. Merger would not create span in	
										North/Clay	157	excess of 65	
E-18A	18	0.5	3 to E-18C^	17	16	21	22	18	29	South/Clay	157	Small mudflat exists between E-18A, E-18C & E-18B. Merger would not create span in	
										North/Clay	159	excess of 65	
E-17	36	0.5	34 to E-18A^	38	39	36	40	31	44	South/Clay	164		
										North/Clay	170		
E-16	38	2.5	67 to E-17^	42	38	48	36	38	47	South/Clay	178		
										North/Clay	187		
E-15A	23	1	13 to E-16^	28	31	29	25	28		South/Sand	187		
										North/Anchor (2005)	195		
E-15B	49	1	1 Shared Touch Down ^	50	52	52	51	47		South/Anchor (2005)	197		
										North/Grout Bag (2001)	206	Replace grout bag touchdown point with anchor between spans E-08A and E-15B	1
E-08A	56	1	1 Shared Grout Bags ^	58	56	54	65	56	62	South/Grout Bag (2001)	206		
										North/Anchor (2003)	219		
E-8B	72	2	1 Shared Touch Down ^	69	70	71	66	73		South/Anchor (2003)	219	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2005)	227		
E-08C/D South	50	3	1 Shared Touch Down ^	58	76	39	79	97		South/Anchor (2005)	227		
						20				North/Anchor (2014)	230		
E-08C/D North	36	2	1 Shared Touch Down ^	18						South/Anchor (2014)	230	1ft increase. No indication it will near the 65' trigger based on historical information	
										North/Sand	230		
E-09	38	0.5	16 to E-08C/D North^	35	41	33	33	40	39	South/Sand	232		
										North/Sand	233		
E-10	40	2	72 to E-09^	47	52	50	49	44		South/Clay	232		
										North/Clay	233		
E-11	69	2	6 to E-10^	66	63	70	74	69		South/Clay	235	Long shallow to north indicating little support. Small mound between south ends of	1
										North/Clay	231	merger with E-10.	
E-12	34	1	59 to E-11^	34	39	41	88	81	81	South/Clay	233		
										North/Clay	230		
E-13A	30	1	61 to E-12^	29	27	32	40	34	36	South/Clay	231		
										North/Anchor (2004)	233		
E-13B South	55	1	1 Shared Touch Down ^	58	56	106	116	112	115	South/Anchor (2004)	233		
										North/Anchor (2010)	231		
E-13B North	56	1	1 Shared Touch Down ^	57	56					South/Anchor (2010)	231		
										North/Anchor (2004)	228		
E-13C South	51	1.5	1 Shared Touch Down ^	51	48	107	105	99	102	South/Anchor (2004)	228		
										North/Anchor (2010)	228		
E-13C North	56	1.5	1 Shared Touch Down ^	52	56					South/Anchor (2010)	228		
										North/Clay	219		

E-3A	30	1	129 to E-13C North^	27	87	76	68	90	62	South/Clay	220		
										North/Anchor (2014)	224		
E-3B	40	1	1 Shared Touch Down ^	53						South/Anchor (2014)	224		
										North/Clay	220		
E-76A	15	1	7 to E-3B^	NA	NA	Silted In	18	20	82	South/Clay-Sand	220		
										North/Anchor (2005)	220		
E-76B	56	1	1 Shared Touch Down ^	58	58	66	43	59		South/Anchor (2005)	220		
										North/Clay-Sand	220		
E-02A South	21	0.5	245 to E-76B^	15	76	80	80			South/Sand	221		
										North/Anchor (2014)	221		
E-02A North	46	0.5	1 Shared Touch Down ^	55						South/Anchor (2014)	221		
										North/Anchor (2006)	221		
E-02B	26	0.5	1 Shared Touch Down ^	26	32	30	33			South/Anchor (2006)	221		
										North/Sand	219		
E-01A South	24	2.5	16 to E-02B^	28	81	85	84	88	88	South/Sand	219		
										North/Anchor (2014)	220		
E-01A North	62	2	1 Shared Touch Down ^	53						South/Anchor (2014)	220		
										North/Anchor (2003)	220		
E-01B-A South	51	3	1 Shared Touch Down ^	53	39	100	96	96	107	South/Anchor (2003)	220		
										North/Anchor (2012)	215		
E-01B-A North	42	2	1 Shared Touch Down ^	43	53					South/Anchor (2012)	215		
										North/Anchor (2004)	209		
E-01B-B	52	2	1 Shared Touch Down ^	48	82	62	74	68	65	South/Anchor (2004)	209		
										North/Sand	200		
E-04A South	14	1	74 to E-01B-B^	17	84	82	84	101		South/Sand	189		
										North/Anchor (2014)	188		
E-04A North	65	1	1 Shared Touch Down ^	59						South/Anchor (2014)	188	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2006)	179		
E-04B	20	1	1 Shared Touch Down ^	19	20	26	23	101		South/Anchor (2006)	179		
										North/Sand	176		
E-05A South	13	1	48 to E-04B^	27	80	75	82	77	74	South/Sand	172		
										North/Anchor (2014)	169		
E-05A North	60	1	1 Shared Touch Down ^	55						South/Anchor (2014)	169		
										North/Anchor (2003)	160		
E-05B	58	1	1 Shared Touch Down ^	67	65	63	62	57	61	South/Anchor (2003)	160		
										North/Sand	149		
E-06	59	1	230 to E-05B^	52	60	60	76	65	67	South/Sand	119		
										North/Sand	114		
E-07	60	0.5	41 to E-06^	52	62	72	74	69	70	South/Sand	107		
										North/Sand	100		
E-65A	56	0.5	464 to E-07^	62	64	67	67	59		South/Sand	69		
										North/Anchor (2005)	69		
E-65B	52	1	1 Shared Touch Down ^	61	61	60	65	64		South/Anchor (2005)	69		
										North/Sand	69		
Northern Exposure Point	NA	NA	147 to E-65B	NA	NA	NA	NA	NA	NA	Only/Sand	66		
Total Span Length:	**5,702**	**Total Support Length:**	**5,424**									**Total:**	**5**

Span Identifier Legend	
W or E	Identifies if the span is located on the West of East leg of Line 5
##	Identifies the sequence or order of when that span was originally discovered
A,B,C &/or North, South	Identifies that the original span has been mitigated in the past

Legend	
	Color used to separate spans for ease of viewing
	Color used to separate spans for ease of viewing
	Color used to denote future anchor to be installed between spans and not within span
	Installed anchors
^	Denotes distance referenced to span above
^^	Denotes distance referenced to two spans above

Installed Anchor Totals to Date

East	
2003	7
2004	8
2005	9
2006	7
2010	3
2012	8
2014	23
2016	1
Total	66

West	
2003	11
2004	8
2005	3
2006	6
2010	4
2012	9
2014	17
2016	3
Total	61

Total Length from Southern to Northern Exposure Points:	11,054

Total Span Length:	5,702	
Total Support Length:	5,424	
Total:	11,126	
Difference to Exposure	72	Difference attributed to rounding

* All measurements are in feet * Span Identifier	2016 Length	2016 Span Height (Approximate)	2016 Support Length	2014 Length	2012 Length	2010 Length	2007 Length	2006 Length	2005 Length	Touch Down Position and Type (Year Install)	Support Depth	Notes	Potential Proposed in 2016 (not yet installed)
Southern Exposure Point	NA	NA	NA	NA	NA	NA	NA	NA	NA	Only/Sand	67		
W-01A	61	2.5	753 to Southern Exposure^	66	65	79	63	66	71	South/Sand	77		
										North/Anchor (2003)	78		
W-01B South	63	2.5	1 Shared Touch Down ^	59	80	79	83	77	80	South/Anchor (2003)	78		
										North/Anchor (2014)	78		
W-01B North	19	2.5	1 Shared Touch Down ^	21						South/Anchor(2014)	78		
										North/Sand	78		
W-5A	13	1	648 to W-01B North^	71	70	81	83	80	74	South/Sand	78		
										[redacted]	76		
W-5B	65	1	1 Shared Touch Down ^							[redacted]	76	In excess of 65'	
										North/Sand	74		
W-77	NA	NA	NA	NA	Silted in	37	25	24	11	NA	NA		
										NA	NA		
W-4	13	1	214 to W-5B^^	12	16	13	18	18	14	South/Sand	73	Small touchdown between W-4, W-3 & W-2B. Merger would create span in	
										North/Sand	73	excess of 75'	
W-3	43	1.5	2 to W-4^	42	43	39	41	31	22	South/Sand	74	Small touchdown between W-3 & W-4. Washout and merger would not	
										North/Sand	74	create span in excess of 65'	
W-2A	58	1.5	5 to W-3^	53	52	54	54	53		South/Sand	73	Small touchdown between W-2A & W-3. Washout and merger would create	
										North/Anchor (2006)	75	span in excess of 75'	
W-2B	12	1.5	1 Shared Touch Down ^	12	14	10	10	10		South/Anchor (2006)	75		
										North/Sand	73		
W-6A	36	2	12 to W-2B^	40	72	83	82	72	68	South/Clay	73		
										North/Anchor (2014)	73		
W-6B	34	2	1 Shared Touch Down ^	32						South/Anchor(2014)	73		
										North/Clay	75		
W-7	55	2	82 to W-6B^	47	46	Merged 50	34	22	33	South/Clay	73		
W-8							22	17	23	North/Clay	73		
W-9	51	2.5	23 to W-7/8^	51	53	53	65	55	57	South/Clay	69		
										North/Clay	75		
W-11	52	2.5	107 to W-9^	48	52	47	40	46	49	South/Sand	75	Install anchors to support deflection area just south of span W-11	5
										North/Sand	80		
W-10	66	3	180 to W-11^	66	64	69	63	63	53	South/Sand	82	In excess of 65'	
										North/Sand	86		
W-12A	34	1.5	138 to W-10^	35	43	91	94	95	97	South/Sand	91		
										North/Anchor (2012)	91		
W-12B	55	1.5	1 Shared Touch Down ^	56'	46					South/Anchor (2012)	91		
										North/Sand	91		
W-13A	30	3	65 to W-12B^	28'	83	87	90	76	75	South/Sand	89		
										North/Anchor (2014)	93		
W-13B	47	3	1 Shared Touch Down ^	54						South/Anchor (2014)	93		
										North/Sand	94		
W-14	50	1.5	30 to W-13B^	51	54	51	74	62	48	South/Sand	95		
										North/Sand	97		
W-16	46	0.5	26 to W-14^	40	44	45	42	48	36	South/Sand	97		
										North/Sand	98		
W-15	41	0.5	254 to W-16^	37	37	38	39	45	37	South/Sand	99		
										North/Sand	100		
W-17	19	0.5	112 to W-15^	NA	NA	Filled in	23	36	26	South/Sand	106		
										North/Sand	107		
W-18A_A	13	2	28 to W-17^	8	14	15	15	16		South/Sand	108		
										North/Anchor (2006)	109		
W-18A South	48	2.5	1 Shared Touch Down ^	42	42	41	100	99		South/Anchor (2006)	109		
										North/Anchor (2010)	116		
W-18A North	52	2	1 Shared Touch Down ^	55	55	55				South/Anchor (2010)	116		
										North/Anchor (2004)	120		
W-18B South	56	1	1 Shared Touch Down ^	62	82	91	93	87	95	South/Anchor (2004)	120		
										North/Anchor (2014)	123		
W-18B North	19	1	1 Shared Touch Down ^	24						South/Anchor (2014)	123		
										North/Sand	123		
W-20	Silted In	NA	NA	22'	27	47	45	46	49	South/Sand	125		
										North/Sand	125		
W-24A	14	2.5	108 to W-18B North^^	12	17	90	82	86	87	South/Sand	125		
										North/Anchor (2012)	126		
W-24B	67	2	1 Shared Touch Down ^	70	69					South/Anchor (2012)	126	Anchor on south, long Shadow to north indicating little support.	1
										North/Sand	125		
W-23A	62	0.5	15 to W-24B^	49	63	63	62	61	68	South/Sand	126	13' increase but no history in excess of 68' No other criteria meet.	
										North/Anchor (2004)	127		
W-23B	37	1	1 Shared Touch Down ^	36	23	57	57	56	56	South/Anchor (2004)	127		
										North/Sand	127		
W-22	35	2	64 to W-23B^	30	33	34	31	37	39	South/Sand	127		
										North/Sand	126		
W-21	52	2	50 to W-22^	51	50	60	58	65	59	South/Sand	127		

W-21	52	2	50 to W-22	51	50	60	58	63	55	North/Sand	129		
W-25	NA	NA	NA	NA	Silted in	9	30	34	41	NA	NA		
										NA	NA		
W-26	69	1	218 to W-21^^	54	53	66	71	72	64	South/Sand	129	In excess of 65'. 15' increase	
										North/Sand	131		
W-27	NA	NA	NA	NA	Silted in	12	17	23	19	NA	NA		
										NA	NA		
W-30	62	1.5	150 to W-26^^	54	57	62	62	62	60	South/Sand	133		
										North/Sand	135		
W-28A South	12	3	149 to W-30^	6	70	77	77	84	73	South/Clay	135		
										North/Anchor (2014)	136		
W-28A North	64	3	1 Shared Touch Down ^	65						South/Anchor (2014)	136		
										North/Anchor (2003)	138		
W-28B	53	2	1 Shared Touch Down ^	59	67	70	50	58	58	South/Anchor (2003)	138		
										North/Clay	136		
W-28	32	1	28 to W-28B^	35	30	34	34	30	28	South/Clay	136		
										North/Clay	136		
W-76	NA	NA	NA	NA	Silted in	20	16	18		NA	NA		
										NA	NA		
W-31A South	44	0.5	121 to W-28^^	38	90	90	89	92	92	Clay	135		
										North/Anchor (2014)	137		
W-31A North	40	0.5	1 Shared Touch Down ^	51						South/Anchor (2014)	137		
										North/Anchor (2004)	137		
W-31B South	41	0.5	1 Shared Touch Down ^	54	78	75	86	83	84	South/Anchor (2004)	137		
										North/Anchor (2014)	138		
W-31B	36	0.5	1 Shared Touch Down ^	25						South/Anchor (2014)	138	11 increase. Well below the 65' trigger.	
										North/Sand	137		
W-34A	25	0.5	20 to W-31B^	26	Silted in	17	10	17		South/Sand	137		
										North/Anchor (2006)	137		
W-34B South	63	1	1 Shared Touch Down ^	64	64	97	108	110		South/Anchor (2006)	137		
										North/Anchor (2010)	136		
W-34B North	36	1	1 Shared Touch Down ^	38	35					South/Anchor (2010)	136		
										North/Sand	133		
W-37A	48	1	47 to W-34B North^	43	79	76	79	101		South/Sand	132		
										North/Anchor (2014)	133		
W-37B	35	1	1 Shared Touch Down ^	36						South/Anchor (2014)	133		
										North/Sand	133		
W-36A	36	1.5	24 to W-37B^	37	37	38	39	38		South/Sand	130		
										North/Anchor (2006)	130		
W-36B	52	1.5	1 Shared Touch Down ^	54	50	51	53	49		South/Anchor (2006)	130		
										North/Grout Bags (2001)	129	Replace grout bag touchdown point with anchor between spans W-36B and W35A	1
W-35A	30	0.5	1 Shared Touch Down ^	27	32	33	25	31	33	South/Grout Bags (2001)	129		
										North/Anchor (2004)	128		
W-35B South	67	0.5	1 Shared Touch Down ^	61	79	89	90	90	87	South/Anchor (2004)	128	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2014)	124		
W-35B North	16	0.5	1 Shared Touch Down ^	24						South/Anchor (2014)	124		
										North/Sand	122		
W-38	68	1	65 to W-35B North^	59	Merged 53	47	36	31	34	South/Sand	123	Anchor on north, pipe into burial 76' to south. Previous touchdown (grout bags) no longer touching	
W-39						26	27	31	17	North/Anchor (2005)	125		
W-40	44	1	1 Shared Touch Down ^	45	44	50	46	44	54	South/Anchor (2005)	125		
										North/Sand	127		
W-41A South	38	1.5	173 to W-40^	37	42	90	87	88	87	South/Sand	134		
										North/Anchor (2012)	141		
W-41A North	45	1.5	1 Shared Touch Down ^	48	49					South/Anchor (2012)	141		
										North/Anchor (2004)	146		
W-41B	68	1	1 Shared Touch Down ^	69	66	73	73	68	65	South/Anchor (2004)	146	Anchor on south, long shadow to north indicating little support.	1
										North/Sand	153		
W-43A	67	2	27 to W-41B^	64	64	63	59	64	68	South/Sand	157	Anchor on north, long Shadow to south indicating little support.	1
										North/Anchor (2003)	165		
W-43B	64	2	1 Shared Touch Down ^	65	68	67	69	64	62	South/Anchor (2003)	165		
										North/Sand	172		
W-42A	70	1.5	12 to W-43B^	71	70	72	67	73	73	South/Sand	172	In excess of 65'	
										North/Anchor (2003)	171		
W-42B	68	1	1 Shared Touch Down ^	67	71	71	77	69	75	South/Anchor (2003)	171	Anchor on south, long shadow to north indicating little support. History of length exceeding 75'	1
										North/Sand	167		
W-45	29	0.5	11 to W-42B^	35	27	25	27	26	24	South/Sand	166		
										North/Sand	166		
W-46	49	1	50 to W-45^	54	44	53	82	82	77	South/Sand	166		
										North/Sand	166		
W-47	42	1.5	156 to W-46^	41	37	61	69	67	62	South/Clay	175		
										North/Clay	173		
W-51A	19	1.5	18 to W-47^	16	14	14	11	20		South/Clay	173		
										North/Anchor (2006)	173		
W-51B South	56	1	1 Shared Touch Down ^	58	82	84	81	80		South/Anchor (2006)	173		

W-51B South	30	1	1 Shared Touch Down^	30	32	34	31	30		North/Anchor (2014)	177		
W-51B North	26	1	1 Shared Touch Down ^	24						South/Anchor (2014)	177		
										North/Clay	175		
W-50	13	0.5	33 to W-51B North^	20	Filled in	23	18	26	12	South/Clay	175		
										North/Clay	175		
W-49	46	1.5	45 to W-50^	50	54	52	61	47	47	South/Clay	175	Small 4' touch down between W-49 & W-48A, risk of merger. After additional discussion it was determined that only 1 anchor would be needed near small touchdown, vs. 2 (1 per span)	2
										North/Clay	173		
W-48A	62	1	4 to W-49^	54	61	57	60	59	63	South/Clay	173		
										North/Anchor (2003)	180		
W-48B	65	1	1 Shared Touch Down ^	63	67	79	59	72	66	South/Anchor (2003)	180	Anchor on south, long shadow to north indicating little support. History of length exceeding 75'	1
										North/Clay	179		
W-52	66	1	23 to W-48B^	59	60	91	61	63	66	South/Clay	178	In excess of 65'	
										North/Clay	177		
W-53A South	17	1	70 to W-52^	69	67	77	67	75		South/Clay	173		
										North/Anchor (2014)	173		
W-53A North	61	1	1 Shared Touch Down ^							South/Anchor (2014)	173		
										North/Anchor (2005)	173		
W-53B	33	0.5	1 Shared Touch Down ^	26	25	31	42	39		South/Anchor (2005)	172		
										North/Clay	173		
W-70 A	70	0.5	78 to W-53B^	42	43	114	100	109		South/Clay-Sand	175	Anchor on north, long shadow to south indicating little support.	
										North/Anchor (2010)	178		
W-70 B	23	0.5	1 Shared Touch Down ^	36	25					South/Anchor (2010)	178		
										North/Clay	178		
W-69A	37	0.5	43 to W-70B^	64	70	96	98	81	88	South/Clay	181		
										North/Anchor (2014)	183		
W-69B	42	0.5	1 Shared Touch Down ^							South/Anchor (2014)	183		
										North/Clay	185		
W-68A South	14	1	109 to W-69B^	11	77	85	75	83	69	South/Clay	193		
										North/Anchor (2014)	195		
W-68A North	64	1	1 Shared Touch Down ^	66						South/Anchor (2014)	195		
										North/Anchor(2003)	194		
W-68B	43	1	1 Shared Touch Down ^	62	60	43	48	41	50	South/Anchor (2003)	194		
										North/Clay	199		
W-71A	32	1	105 to W-68B^	26	77	84	81	84	67	South Clay	220		
										North/Anchor (2014)	227		
W-71B	46	1	1 Shared Touch Down ^	55						South/Anchor (2014)	227		
										North/Anchor (2003)	235		
W-72A South	48	1.5	1 Shared Touch Down ^	57	57	105	107	108	108	South/Anchor (2003)	235		
										North/Anchor (2012)	235		
W-72A North	54	1	1 Shared Touch Down ^	47	47					South/Anchor (2012)	235		
										North/Anchor (2004)	241		
W-72B South	32	1.5	1 Shared Touch Down ^	35	36	100	100	98	99	South/Anchor (2004)	241		
										North/Anchor (2012)	245		
W-72B North	69	1.5	1 Shared Touch Down ^	61	61					South/Anchor (2012)	245	In excess of 65'. No need to mitigate. Anchors on both north and south ends	
										North/Anchor (2004)	249		
W-72C	54	2	1 Shared Touch Down ^	54	59	56	65	52	56	South/Anchor (2004)	249		
										North/Clay	247		
W-75	59	1	19 to W-72C^	61	52	77	57	54	44	South/Clay	246		
										North/Clay	244		
W-56	55	1	75 to W-75^	57	59	67	58	60	61	South/Clay	240		
										North/Clay	241		
W-78	NA	NA	NA	NA	NA	Filled in	16	15		NA	NA		
										NA	NA		
W-54A	57	1	158 to W-56^^	56	56	55	53	60		South/Clay	237		
										North/Anchor (2005)	235		
W-54B	52	1.5	34 to W-54A^	51	49	88	87	86		South/Clay	235	Burial to north long shadow to south indicating little support. History of length exceeding 75'	
										North/Clay	235		
W-57A	47	2.5	70 to W-54B^	43	79	77	67	78	75	South/Clay	233		
										North/Anchor (2014)	233		
W-57B	30	2.5	1 Shared Touch Down ^	40						South/Anchor (2014)	233		
										North/Clay	231		
W-59A-A	NA	NA	NA	NA	Silted in	6	33			NA	NA		
										NA	NA		
W-59A South	38	2.5	321 to W-57B^^	36	45	90	91	130		South/Anchor (2006)	224		
										North/Anchor (2012)	224		
W-59A North	46	2.5	1 Shared Touch Down ^	53	47					South/Anchor (2012)	224		
										North/Anchor (2003)	222		
W-59B South	41	3	1 Shared Touch Down ^	41	52	104	97	100		South/Anchor (2003)	222		
										North/Anchor (2012)	222		
W-59B North	55	3	1 Shared Touch Down ^	56	45					South/Anchor (2012)	222		
										North/Anchor (2003)	215		
W-58A South	59	2	1 Shared Touch Down ^	62	62	126	132	131		South/Anchor (2003)	215		
										North/Anchor (2010)	210		
W-58A North	71	2.5	1 Shared Touch Down ^	70	70					South/Anchor (2010)	210	In excess of 65'. No need to mitigate. Anchors on both north and south ends	

W-58A North	71	2.5	1 Shared Touch Down	70	70					North/Anchor (2003)	193	In excess of 95'. No need to mitigate. Anchors on both north and south end.	
W-58B	35	1.5	1 Shared Touch Down ^	35	36	38	30	28		South/Anchor (2003)	193		
										North/Clay	186		
W-60A	60	1.5	140 to W-58B^	56	58	55	52	60	62	South/Clay	168		
										North/Anchor (2003)	163		
W-60B South	52	2	1 Shared Touch Down ^	50	70	90	91	86	89	South/Anchor (2003)	163		
										North/Anchor (2012)	158		
W-60B North	32	2	1 Shared Touch Down ^	33	20					South/Anchor (2012)	158		
										North/Clay	151		
W-79	NA	NA	NA	NA	Silted in	15	16			NA	NA		
										NA	NA		
W-61A	29	1	78 to W-60B North^^	27	72	80	85	79	84	South/Clay	138		
										North/Anchor (2014)	135		
W-61B	45	1	1 Shared Touch Down ^	45						South/Anchor (2014)	135		
										North/Clay	128		
W-62	46	1	358 to W-61B^	44	46	49	45	44	38	South/Sand	94		
										North/Sand	92		
W-63A	57	1.5	282 to W-62^	54	66	57	49	57	55	South/Sand	81		
										North/Anchor (2004)	81		
W-63B	55	1.5	1 Shared Touch Down ^	53	50	54	54	49	51	South/Anchor (2004)	81		
										North/Sand	79		
W-65A	43	1.5	185 to W-63B^	50	77	90	82	86	80	South/Sand	77		
										North/Anchor (2014)	77		
W-65B	28	1.5	1 Shared Touch Down ^	26						South/Anchor (2014)	77		
										North/Sand	77		
W-64A	16	1	15 to W-65B^	18	20	90	89	90	80	South/Sand	76		
										North/Anchor (2012)	76		
W-64B South	53	1	1 Shared Touch Down ^	46	71					South/Anchor (2012)	76		
										North/Anchor (2014)	76		
W-64B North	22	1	1 Shared Touch Down ^	29						South/Anchor (2014)	75		
										North/Sand	75		
W-67A	40	2	88 to W-64B North^	41	89	87	89	100	86	South/Sand	75		
										North/Anchor (2014)	75		
W-67B	51	2	1 Shared Touch Down ^	50						South/Anchor (2014)	75		
										North/Sand	73		
W-66	42	1.5	194 to W-67B^	43	67	41	45	45	44	South/Sand	73		
										North/Sand	73		
Northern Exposure Point	NA	NA	111 to W-66^	NA	NA	NA	NA	NA	NA	Only/Sand	69		
Total Span Length:	**5,339**	**Total Support Length:**	**6,883**									**Total**	**13**

Span Identifier Legend	
W or E	Identifies if the span is located on the West of East leg of Line 5
##	Identifies the sequence or order of when that span was originally discovered
A,B,C &/or North, South	Identifies that the original span has been mitigated in the past

Legend	
	Color used to separate spans for ease of viewing
	Color used to separate spans for ease of viewing
	Color used to denote future anchor to be installed between spans and not within span
	Installed anchors
^	Denotes distance referenced to span above
^^	Denotes distance referenced to two spans above

Installed Anchor Totals to Date

West	
2003	11
2004	8
2005	3
2006	6
2010	4
2012	9
2014	17
2016	3
Total	61

East	
2003	7
2004	8
2005	9
2006	7
2010	3
2012	8
2014	23
2016	1
Total	66

Total Length from Southern to Northern Exposure Points:	**12,174**

Total Span Length:	**5,339**	
Total Support Length:	**6,883**	
Total:	**12,222**	
Difference to Exposure	**48**	**Difference attributed to rounding**