CASCADE NATURAL GAS CORPORATION
A Subsidiary of MDU Resources Group, Inc.

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June 1, 2017

Mr. Steven V. King
Executive Director and Secretary
Washington Utilities & Transportation Commission
P.O. Box 47250
Olympia, WA 98504-7250

Re: Pipeline Replacement Plan in Accordance with Commission Policy Statement in Docket UG-120715

Dear Mr. King:

In accordance with the Commission's policy statement in Docket UG-120715 Cascade hereby submits its update to the twenty year replacement plan.

If there are any questions regarding the master plan please contact Ryan Privratsky at (509) 734-4599.

Sincerely,

/s/ Michael Parvinen

Michael Parvinen
Director, Regulatory Affairs
Cascade Natural Gas Corporation
8113 W. Grandridge Blvd.
Kennewick, WA 99336-7166
michael.parvinen@cngc.com

Pipeline Replacement Program Plan
Cascade Natural Gas Corporation
2017

in accordance with
Policy Statement in Docket No. UG-120715

Required Contents: Checklist and Table of Contents

Policy Statement		Section/Page
The pipe replacement program plan should consist of three parts: (1) a "master" plan for replacing all pipes with an elevated risk of failure;	In support of its pipe replacement program plan, each gas company should demonstrate that the type of pipe to be replaced under its program presents an elevated risk of cracking, leakage, breakage or other failure. The gas company should explain why the particular type(s) of pipe presents an elevated risk, such as the physical qualities of the pipe as manufactured (e.g., low ductile plastic pipe), the condition of the pipe as installed (e.g., poor soil conditions) or as maintained (e.g., no cathodic protection), the age of the pipe, etc. The gas company should also provide detailed analysis and explanation demonstrating why the pipe it seeks to replace is appropriate for replacement, compared to other pipe. To the extent practical, the gas company should quantify and explain the degree to which risk of failure is elevated for such pipe, compared to other pipe.	**Section 1 – Master Plan** Page 3
(2) a two-year plan that specifically identifies the pipe replacement program goals for the upcoming two-year period;	The first pipe replacement program plan shall be filed by June 1, 2013, covering planned pipe replacement through 2015.	**Section 2 – Two-Year Plan** Page 5
(3) if applicable, a plan for identifying the location of pipe that presents elevated risk of failure.	A prudent pipe replacement program should contain a plan for identifying the location of elevated risk pipe; to the extent the gas company does not presently know the location. The plan should include a timetable under which the gas company will know the location of its elevated risk pipe. The Commission will not require a gas company to know the location of all of its elevated risk pipe as a prerequisite for having a pipe replacement program consistent with the policy statement. A pipe replacement program may focus initially on pipe for which the gas company knows the location.	**Section 3 – Identification Plan** Page 6

Introduction

On December 31, 2012, the Washington Utilities and Transportation Commission issued a policy statement in Docket UG-120715 for the accelerated replacement of natural gas pipeline facilities with elevated risk. This policy statement requires each gas company requesting a special pipe replacement cost recovery mechanism (CRM) to file with the Commission a pipe replacement program plan containing the following elements:

1. *A "master" plan for addressing all pipes with an elevated risk of failure*
2. *A two-year plan that specifically identifies the goals for the upcoming two-year period*
3. *A plan for identifying the location of pipe that presents elevated risk of failure*

Section 1 -Master Plan

This Master Plan will serve as the guide that Cascade Natural Gas Corporation (Cascade) will use to determine which pipelines should be addressed as part of the Pipe Replacement Program. This Master Plan will describe the possible risks that can be associated with a pipeline, how the pipelines are analyzed to assess and quantify risks, how the pipelines to be addressed are identified, and how information for identified and new risks is obtained. The Master Plan will also describe the role that Cascade's Distribution Integrity Management Plan (DIMP) plays in the Pipe Replacement Program.

Possible Risks

Cascade operates pipelines that are classified as Pre-CNG piping systems. Pre-CNG pipelines are distribution systems that were constructed to distribute manufactured gas or natural gas. These pipelines were originally installed, owned, operated, and maintained by others prior to 1955. Cascade acquired many of these systems in the late 1950s and throughout the 1960s. The condition of the pre-CNG pipe is bare steel or coal tar wrapped. This pipe is of concern since it is at least 60 years old and lacked cathodic protection until the early 1970s, leaving the pipe suspect to corrosion risk. The extent of this pipe varies throughout Cascade systems and depends on the history of the system and how it was acquired by Cascade.

In addition to the risks inherent with Pre-CNG pipelines, Cascade's pipelines are exposed to risks due to the following factors:

- Corrosion
- Natural Forces
- Excavation Damage
- Other Outside Force Damage

- Material, Weld, or Joint Failure
- Equipment Failure
- Incorrect Operation
- Other – Forces unique to a particular area on the system

Cascade's DIMP Plan describes these risks in greater detail. Cascade's DIMP Plan is on file with the Commission's Pipeline Safety Division.

Analysis and Quantification

As part of Cascade's DIMP Plan, a GIS-based model has been created and is maintained. Information collected as part of DIMP is input into the model, where it is analyzed to find areas of concern and trends. This allows Cascade to quantify the risk associated with each pipeline based on factors that are pertinent to this Pipe Replacement Program. Cascade's DIMP contains a more detailed explanation of this process.

Identification of Pipelines for Replacement

DIMP model results are used to identify the locations of pipelines that should be addressed in the Pipe Replacement Plan.

For pipelines identified by DIMP, samples of the DIMP model outputs for the areas identified in Section 2 of this document are included in Appendix A. Once replacement locations are identified, specific projects within these areas are planned and prioritized based on coordination with district and on-site personnel considered to be Subject Matter Experts (SMEs). This helps ensure the replacement of the higher risk pipelines within the identified areas.

Obtaining New Information

Cascade obtains new information for their DIMP model and Pipe Replacement Plan through the following methods:

1. Observing trending in DIMP – the DIMP model is analyzed on a yearly basis. As part of this analysis trends are identified and the plan and/or model is modified as needed.
2. Company forms that gather information on exposed pipelines – every time a Cascade pipeline is exposed an Integrity Management Dig Report – Form 625 is completed. Additionally, all leaks are documented with a Leak Investigation – Form 293. Information from these forms are inputted into the DIMP model.
3. Continuing Subject Matter Expert (SME) panel meetings – SME panel meetings are held on an appropriate basis, at least once annually. Information from the

panel meetings is used to validate the DIMP model and new information is input into the DIMP model.

4. Updating model annually – Cascade's DIMP model is updated annually. Results of the model analysis are used to prioritize pipeline replacement projects.

Cascade's DIMP Plan describe these methods in greater detail.

Section 2 - Two Year Plan

Cascade's two-year plan has been divided into two separate time periods. The time periods and the work that are proposed for each are listed below.

November 1, 2016 – October 31, 2017 – Capital Replacement Projects

PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED
CRM RPL ANACORTES BARE STEEL PHASE 5	MT. VERNON	BARE STEEL/PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM RPL LONGVIEW BARE STEEL PHASE 6	LONGVIEW	BARE STEEL/PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM VANCE CREEK EXPOSURE REPLACE	ABERDEEN	EXPOSED PIPE (CORROSION) IN ADDITION TO MODERATE (ORANGE) RISK IN DIMP
CRM CAMP CREEK EXPOSURE REPLACEMENT	ABERDEEN	EXPOSED PIPE (CORROSION) IN ADDITION TO MODERATE (ORANGE) RISK IN DIMP
CRM/MAOP 3" BURLINGTON HP LINE REPL	MT. VERNON	PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM BELLINGHAM BRIDGE CROSSINGS RMV	BELLINGHAM	PRE-CNG PIPE - IDENTIFIED HIGH (RED) & MODERATE (ORANGE) RISK IN DIMP
CRM KELSO GRADE ST BRIDGE RELOCATE	LONGVIEW	EXPOSED PIPE SUSCEPTIBLE TO CORROSION RISK - MODERATE (ORANGE)
CRM 2 IN STEEL IP BORE BELFAIR PL	KENNEWICK	MODERATE (ORANGE) RISK IN DIMP
CRM 6" NOB HILL REPLACEMENT	YAKIMA	IDENTIFIED HIGH (RED) RISK IN DIMP
CRM KENN RR CROSS NEAR KAMIAKIN	KENNEWICK	MODERATE (ORANGE) RISK IN DIMP
CRM/MAOP RPL; 12" STL HP, KELSO PHASE 1	LONGVIEW	HIGH (RED) RISK IN DIMP
CRM SHELTON PIPE REPLACEMENT PHASE 1	ABERDEEN	PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM VANCE CREEK REPLACEMENT (#2)	ABERDEEN	EXPOSED PIPE (CORROSION) IN ADDITION TO MODERATE (ORANGE) RISK IN DIMP
CRM RPL 2" STL MN - BELLINGHAM	BELLINGHAM	IDENTIFIED MODERATE (ORANGE) RISK IN DIMP

These projects were identified through Cascade's DIMP Plan and are both intermediate pressure (IP) (< 60 psig) and high pressure (HP).

November 1, 2017 – October 31, 2018 – Capital Replacement Projects

PROJECT	DISTRICT	TYPE OF PIPE TO BE REPLACED
CRM RPL ANACORTES BARE STEEL PHASE 5/6	MT. VERNON	BARE STEEL/PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM RPL LONGVIEW BARE STEEL PHASE 7	LONGVIEW	BARE STEEL/PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM/MAOP RPL; 12" STL HP, KELSO PHASE 2	LONGVIEW	HIGH (RED) RISK IN DIMP
CRM SHELTON PIPE REPLACEMENT PHASE 2	ABERDEEN	PRE-CNG PIPE - IDENTIFIED HIGH (RED) RISK IN DIMP
CRM YAKIMA PIPE REPLACEMENT PHASE 1	YAKIMA	IDENTIFIED HIGH (RED) RISK IN DIMP
CRM RICHLAND 7" PRE-CNG	RICHLAND	IDENTIFIED HIGH (RED) RISK IN DIMP

The projects listed in these tentative schedules are based on the best information available at this time. As more information becomes available and the DIMP models are updated, the prioritization of the projects may change. DIMP output for replacement projects is shown in Appendix A.

Section 3 - Plan for Identifying the Location of Pipe that Presents Elevated Risk of Failure

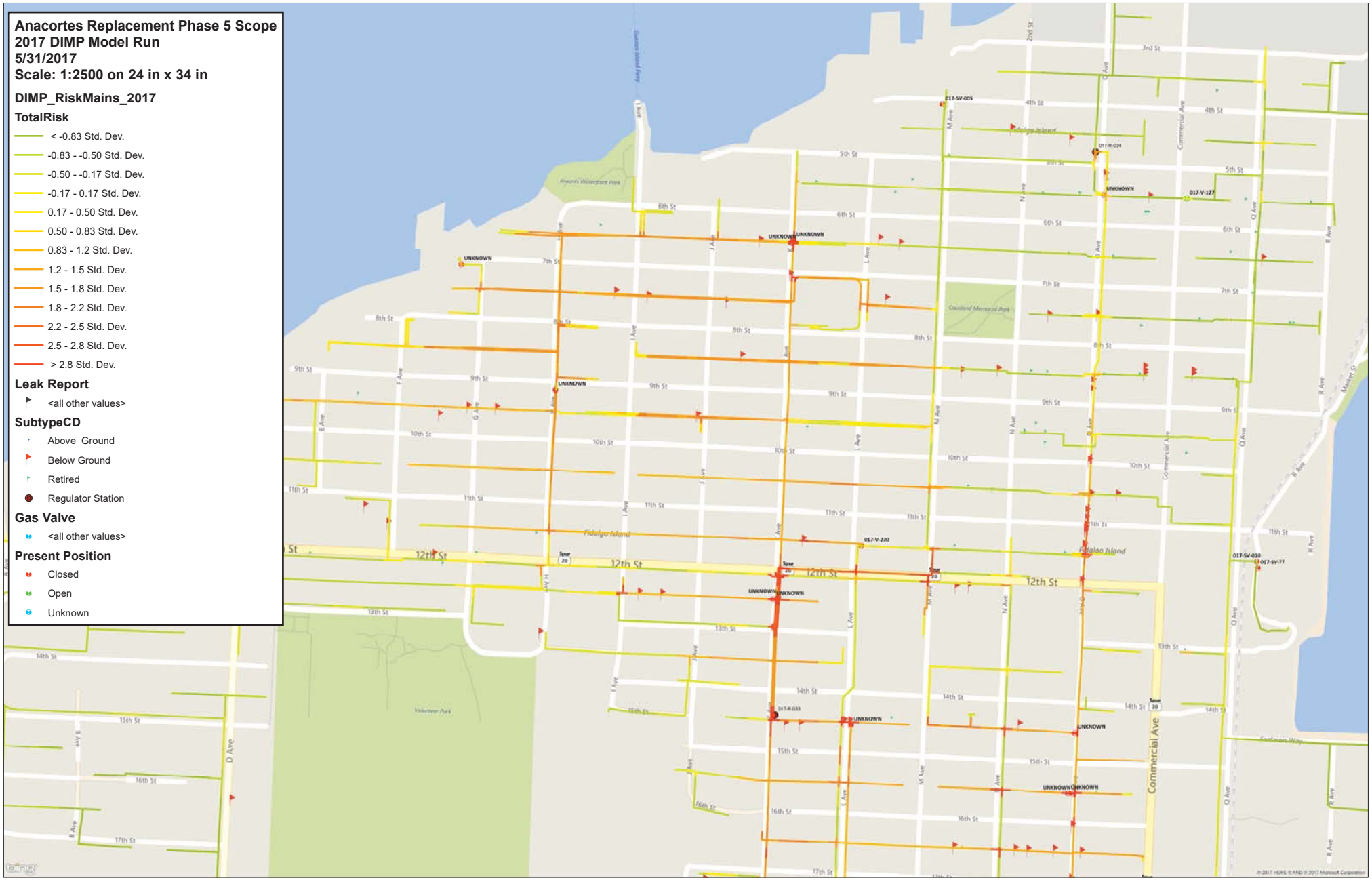
Cascade identifies the location of pipe that presents an elevated risk of failure through the DIMP plan and model. DIMP calls for information to be gathered on exposed pipe, leaks to be tracked, and SME knowledge to be incorporated into the plan. DIMP has sufficient flexibility to identify and adjust to trends and new sources of information. Yearly analyses are performed that quantify the risks on each pipeline.

As outlined in Cascade's DIMP, additional or accelerated (A/A) actions are implemented when existing compliance activities and procedures need to be supplemented to address risk identified to the integrity of Cascade's distribution system. A/A actions that may be implemented to mitigate risk are outlined in Cascade's DIMP, as well as the requirements for implementation and documentation.

In instances where unknown pipe properties are encountered (i.e. pipe grade, wall thickness, material type, etc.) Cascade takes actions to obtain unknown properties. These actions include, but are not limited to, removal and sampling, in-situ testing, and pipeline replacement.

APPENDIX A
DIMP MODEL OUTPUT

Areas in red represent highest risk areas.


Anacortes Replacement Phase 5 Scope
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5/31/2017
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1.2 - 1.5 Std. Dev.
1.5 - 1.8 Std. Dev.
1.8 - 2.2 Std. Dev.
2.2 - 2.5 Std. Dev.
2.5 - 2.8 Std. Dev.
> 2.8 Std. Dev.
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Below Ground
Retired
Regulator Station
Gas Valve
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Present Position
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Open
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12th St
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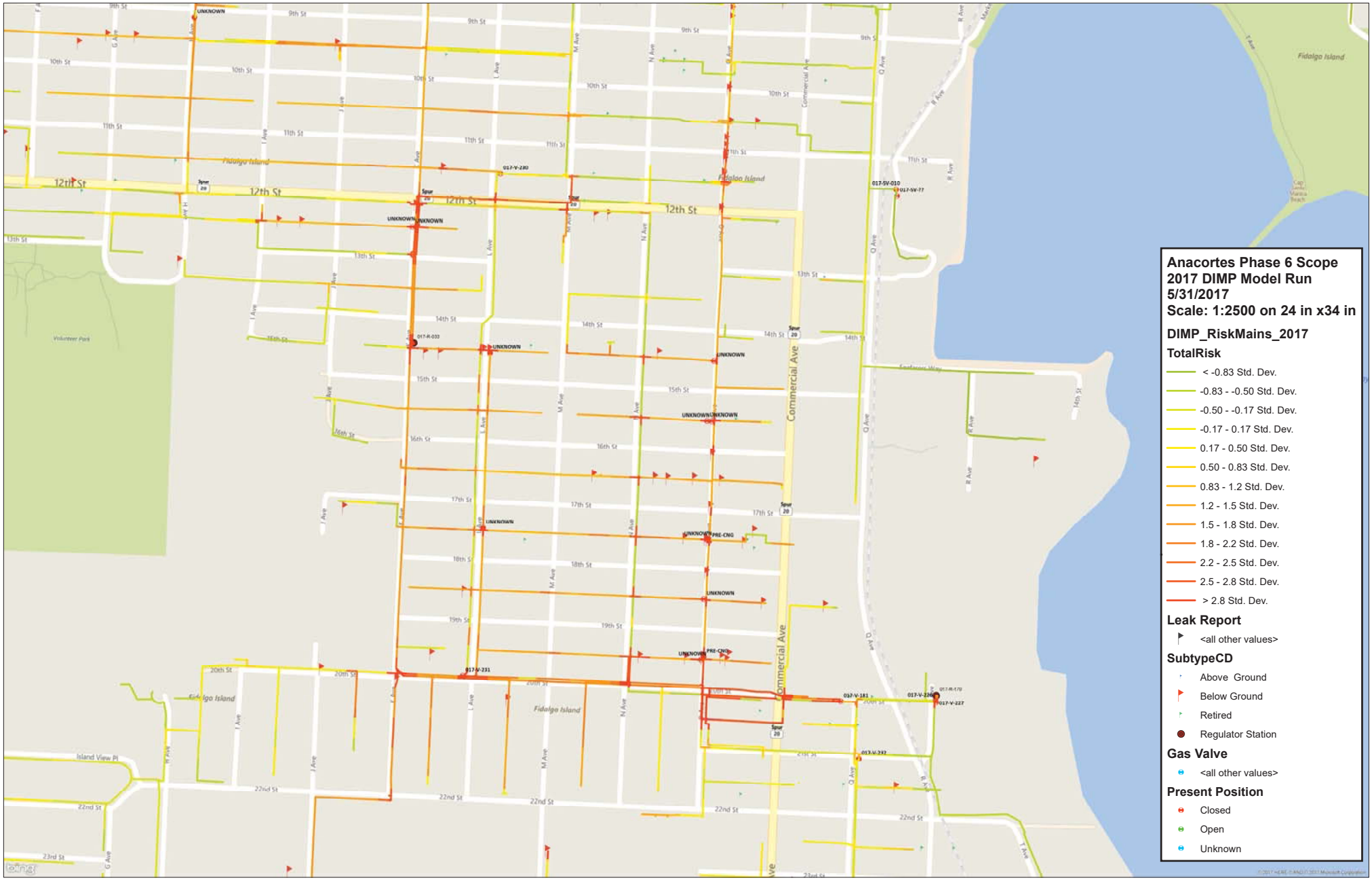
Anacortes Phase 6 Scope
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1.2 - 1.5 Std. Dev.
1.5 - 1.8 Std. Dev.
1.8 - 2.2 Std. Dev.
2.2 - 2.5 Std. Dev.
2.5 - 2.8 Std. Dev.
> 2.8 Std. Dev.
Leak Report
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Below Ground
Retired
Regulator Station
Gas Valve
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Present Position
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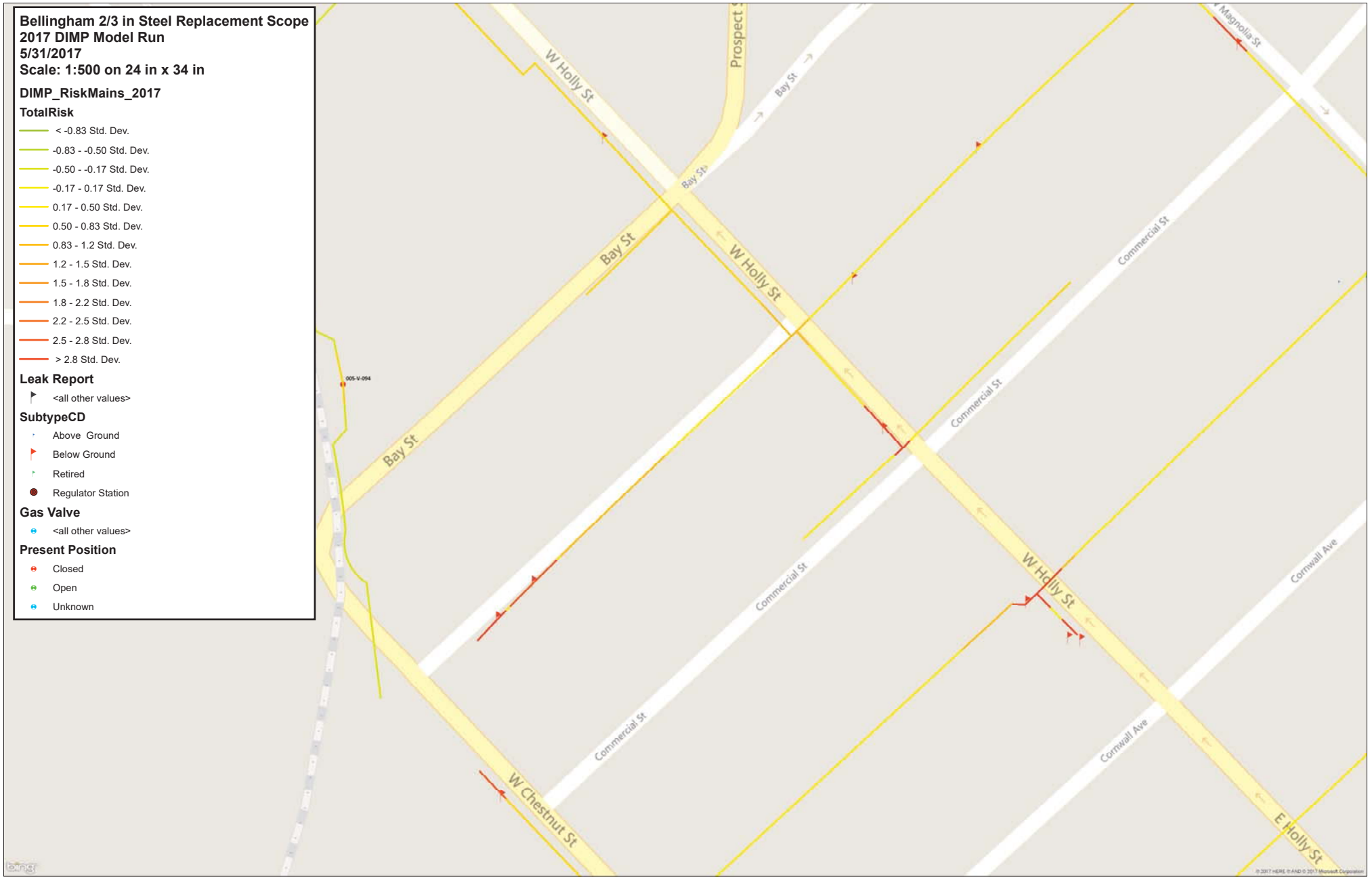
Open
Unknown
Commercial Ave
12th St
Fidalgo Island


Bellingham 2/3 in Steel Replacement Scope
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Below Ground
Retired
Regulator Station
Gas Valve
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Present Position
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Open
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Prospect St
Bay St
Magnolia St
Commercial St
Cornwall Ave
W Chestnut St
E Holly St
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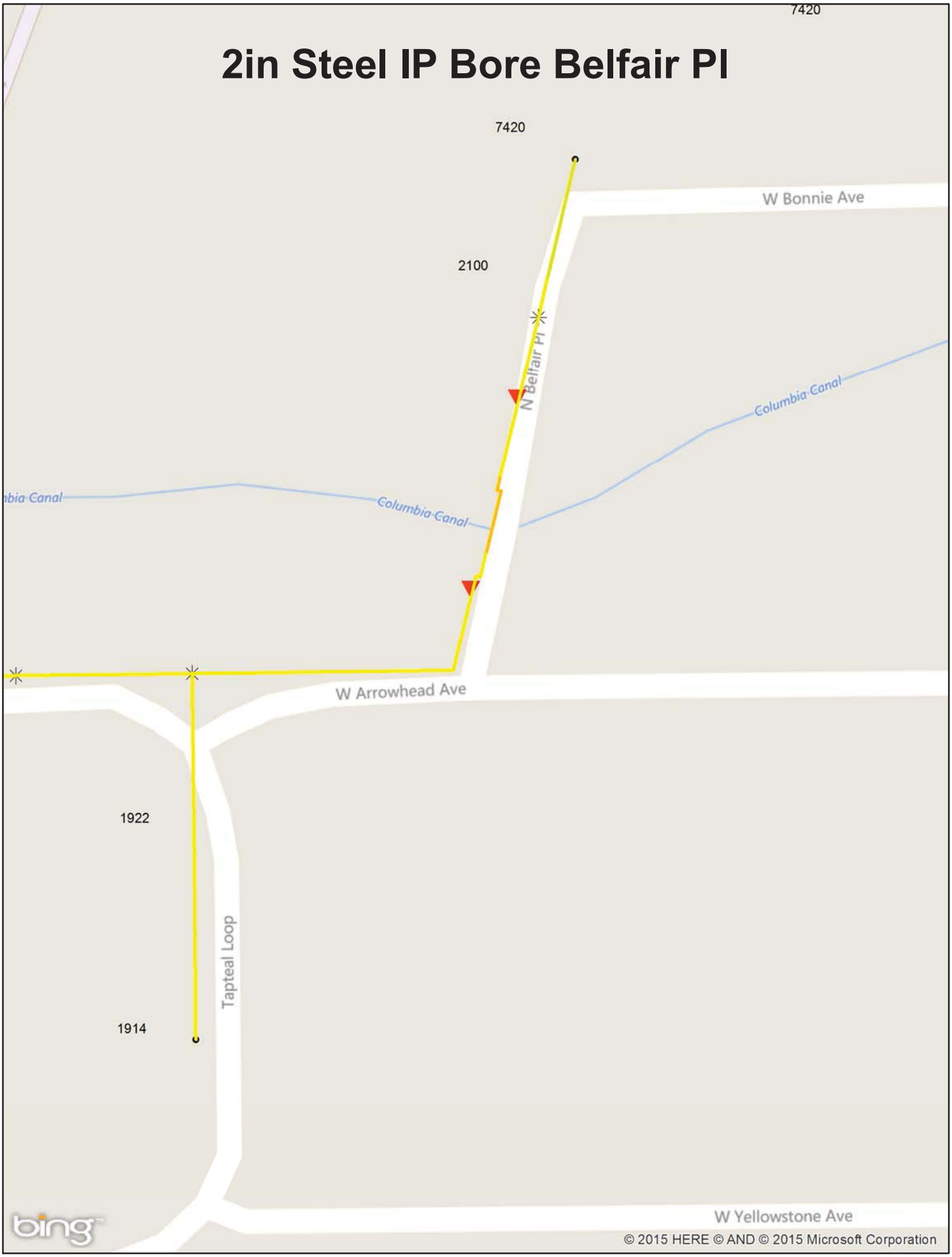
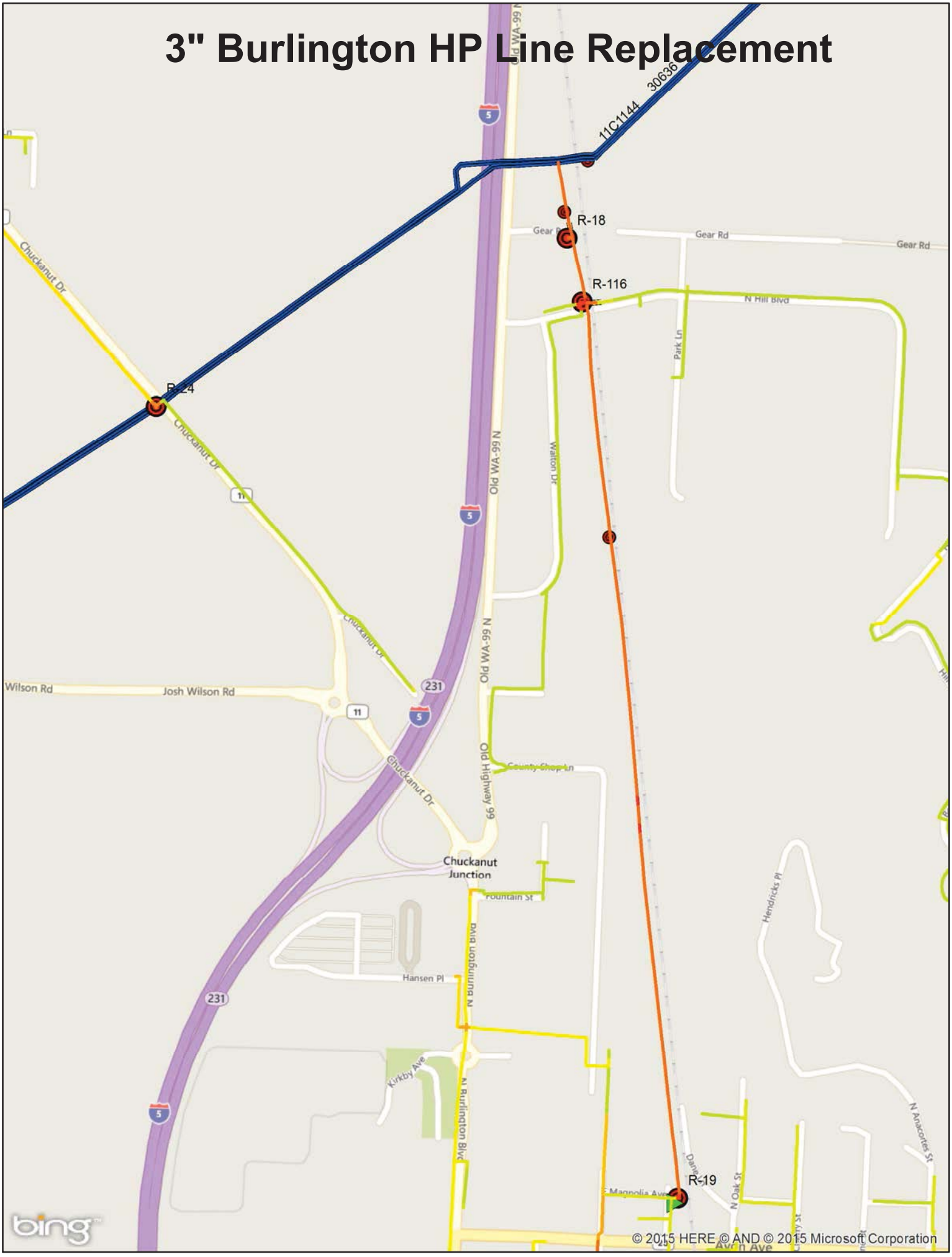
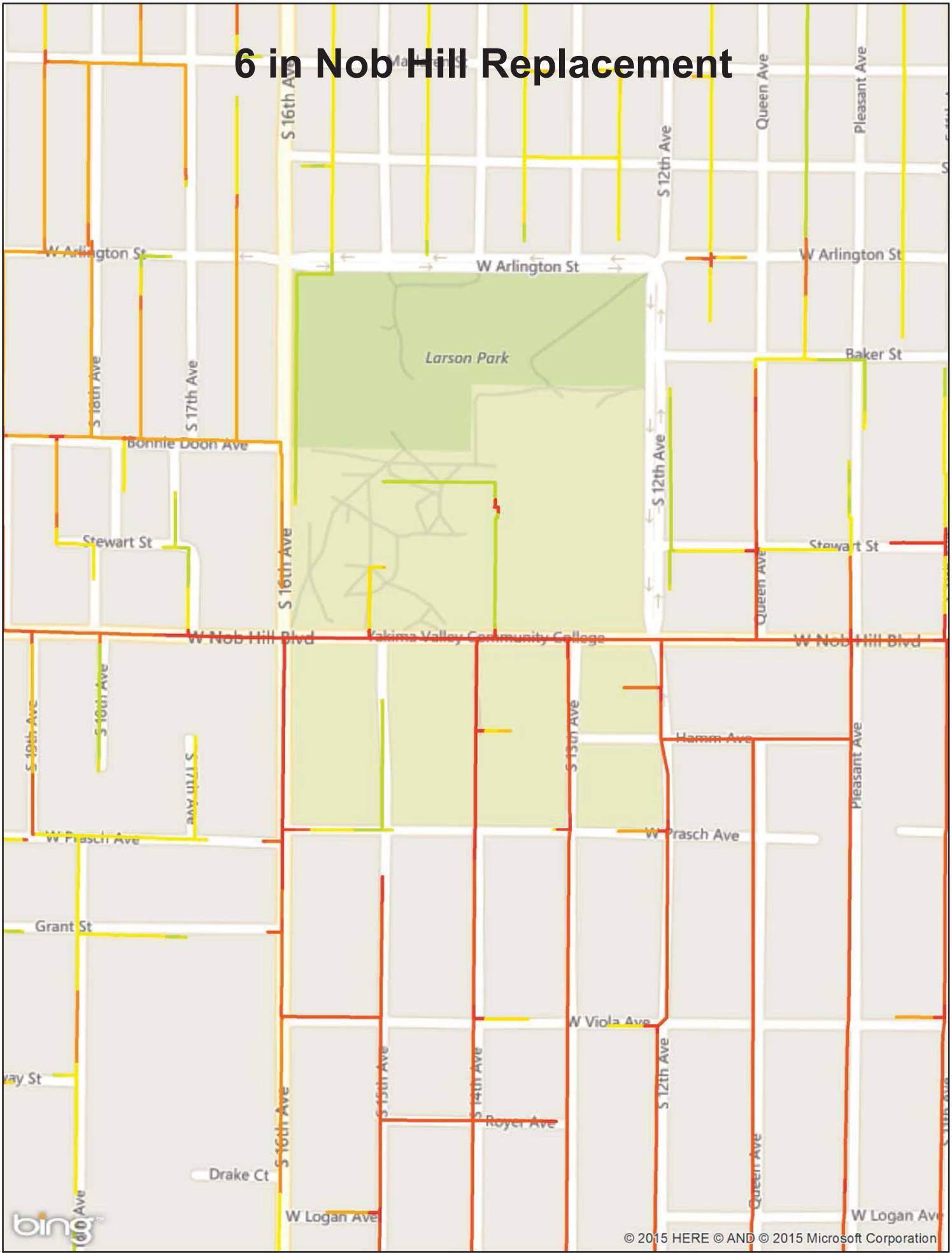
2in Steel IP Bore Belfair Pl



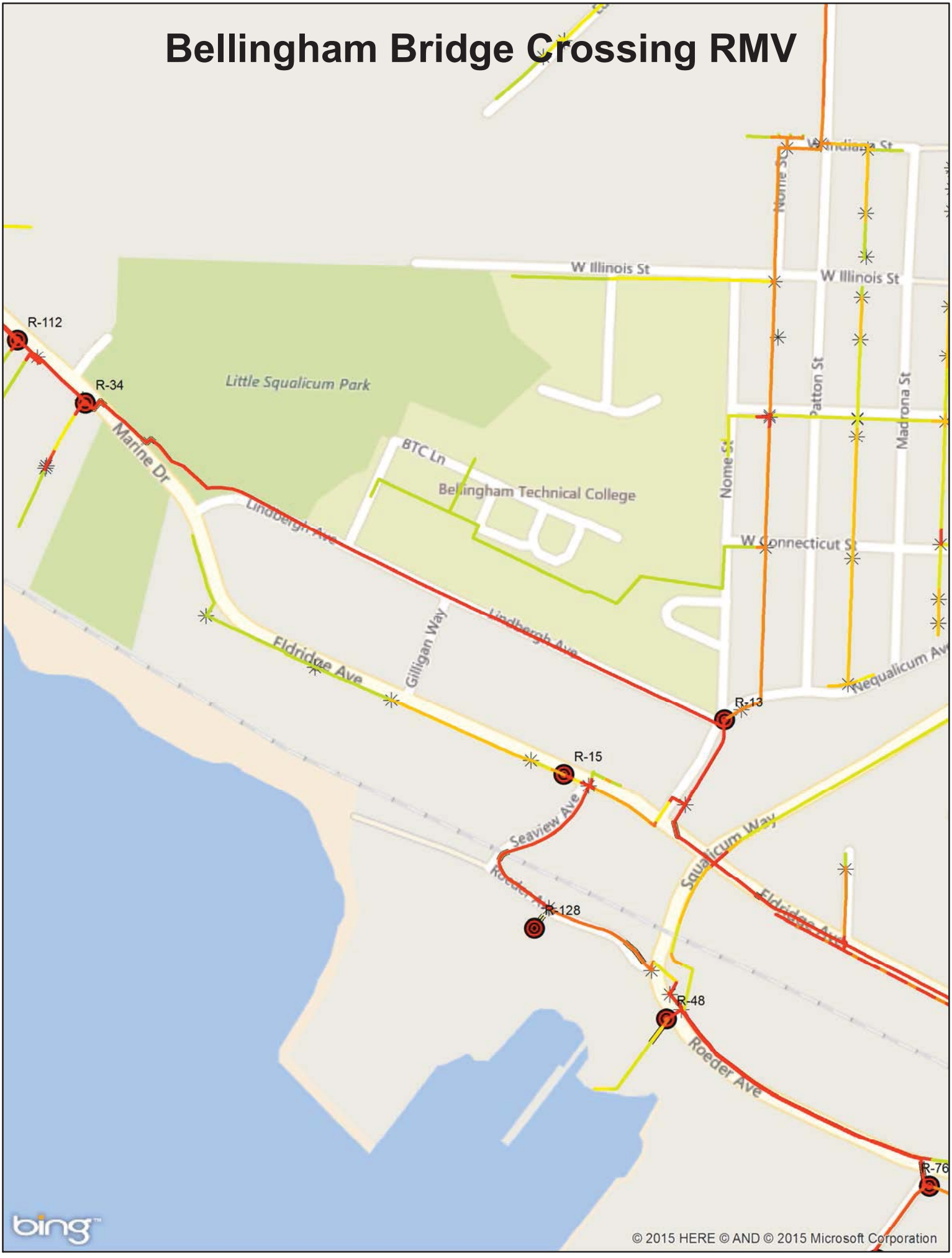
3" Burlington HP Line Replacement



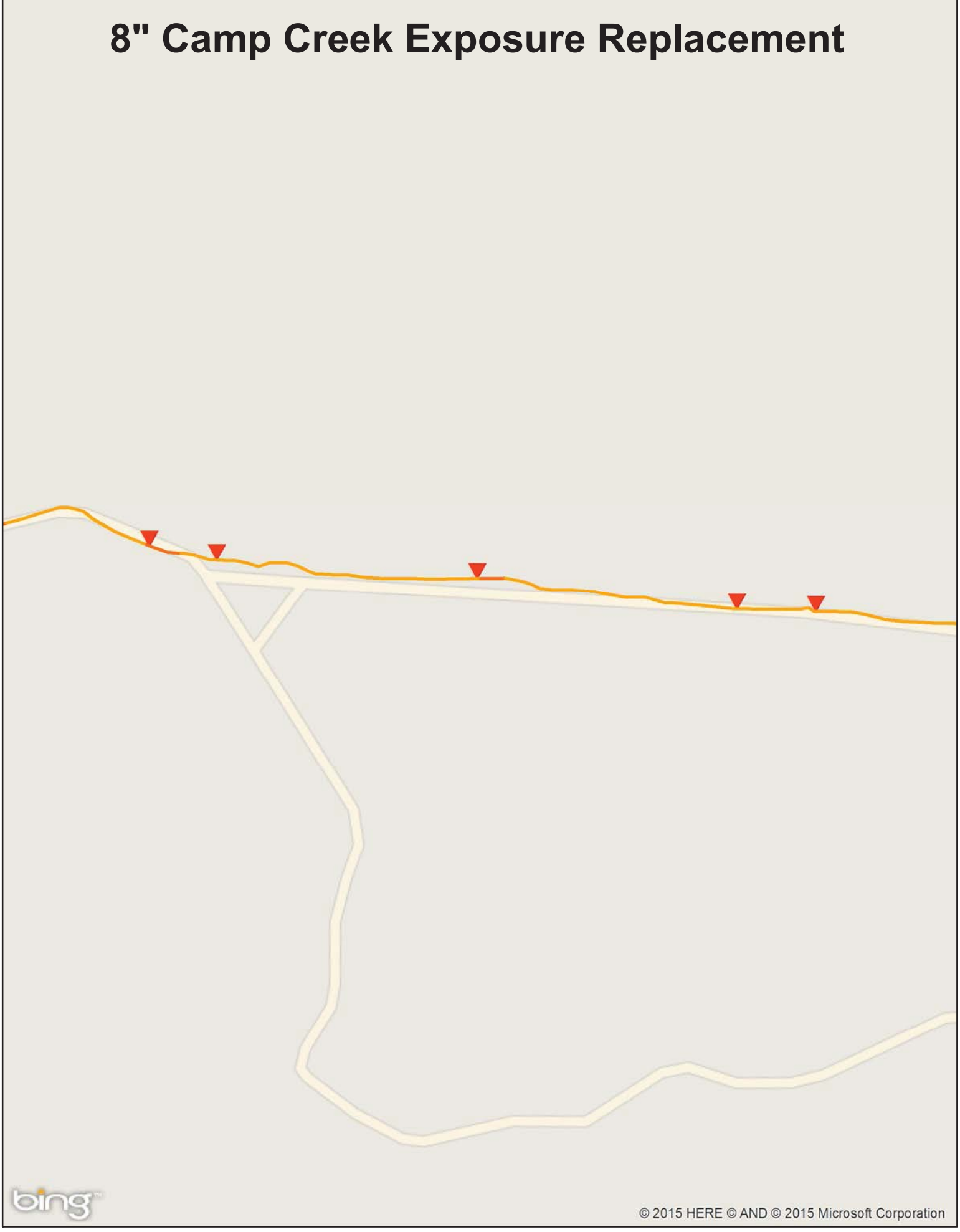
6 in Nob Hill Replacement



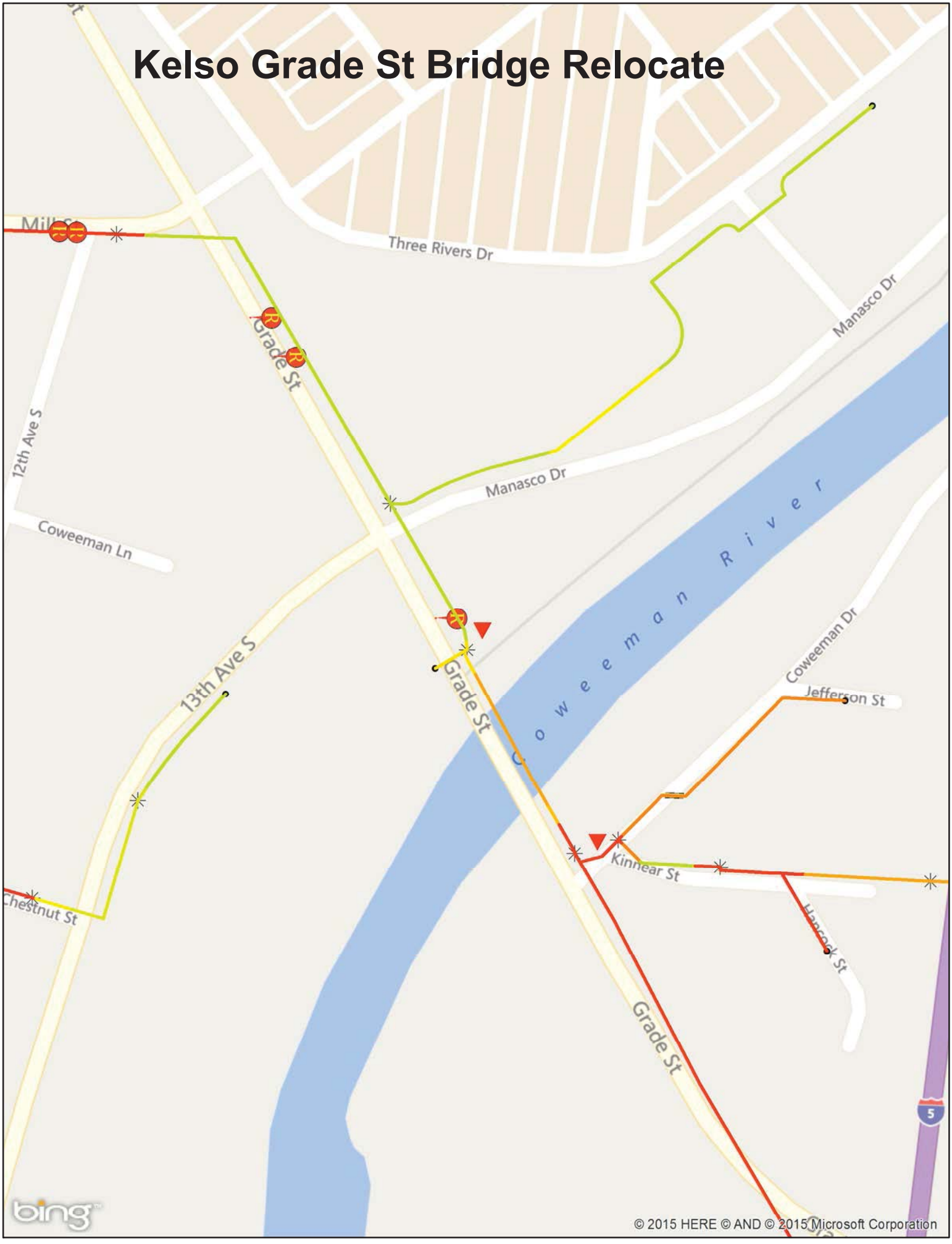
Bellingham Bridge Crossing RMV



8" Camp Creek Exposure Replacement



Kelso Grade St Bridge Relocate



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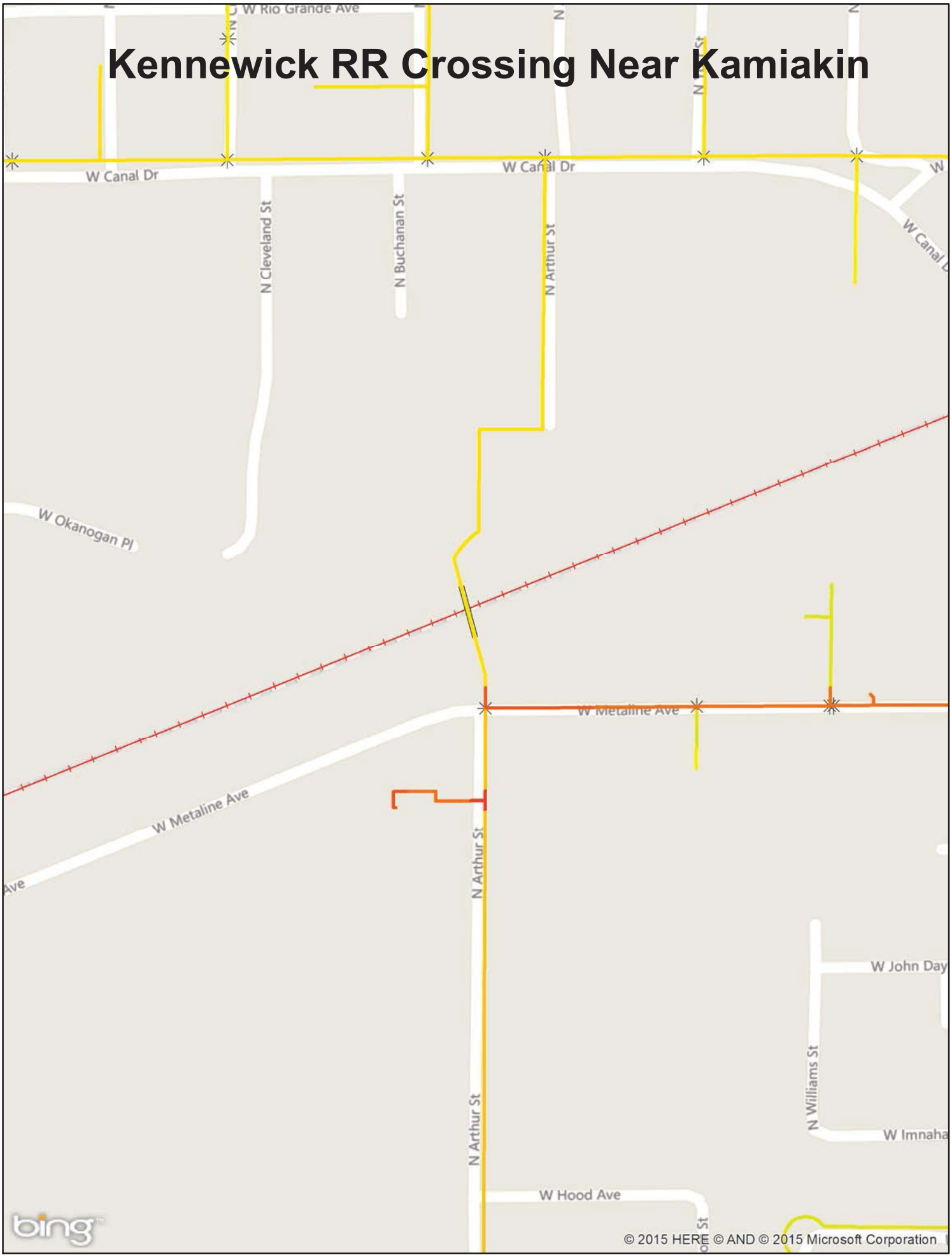

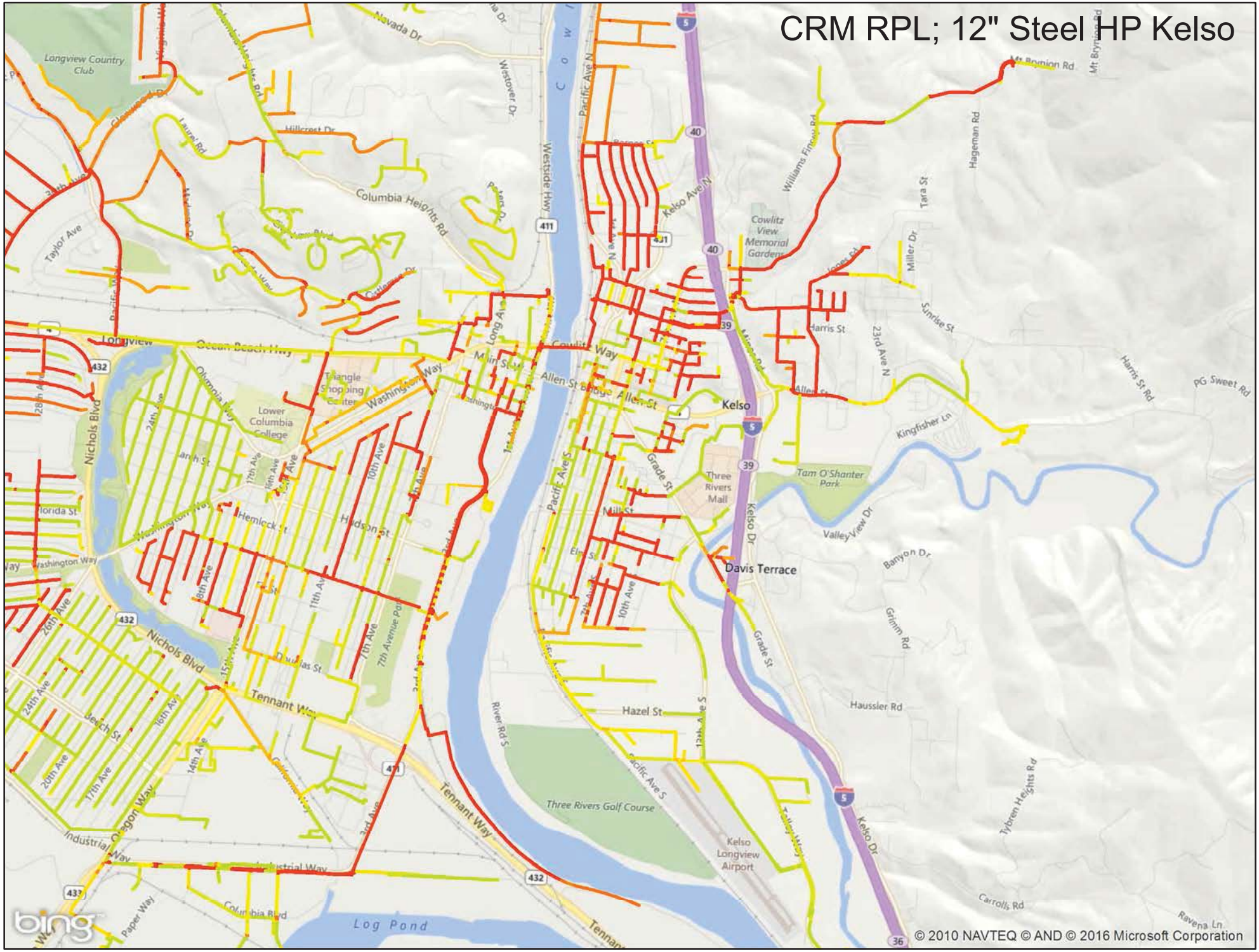
CRM RPL; 12" Steel HP Kelso
Longview Country Club
Nevada Dr
Westover Dr
Columbia Heights Rd
Hillcrest Dr
Laurel Rd
Taylor Ave
Pacific Ave
Westside Hwy
Kelso Ave N
Williams Fineer Rd
Hageman Rd
Mt Brynion Rd
Cowlitz View Memorial Gardens
Tara St
Miller Dr
Sunrise St
Harris St
23rd Ave N
Harris St Rd
PG Sweet Rd
Kingfisher Ln
Tam O'Shanter Park
Valley View Dr
Banyon Dr
Grimm Rd
Haussler Rd
Tybren Heights Rd
Carrolls Rd
Ravena Ln
Longview
Ocean Beach Hwy
Cowlitz Way
Allen St bridge
Allen St
Kelso
Main St
Long Ave
Washington Way
Triangle Shopping Center
Lower Columbia College
Nichols Blvd
Olympia Way
Florida St
Hemlock St
Hudson St
Douglas St
Tennant Way
Beech St
Oregon Way
Industrial Way
Columbia Blvd
Paper Way
Log Pond
Three Rivers Mall
Grade St
Kelso Dr
Davis Terrace
Mill St
Elm St
Hazel St
River Rd S
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Kelso Longview Airport
Pacific Ave S
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7th Avenue Park
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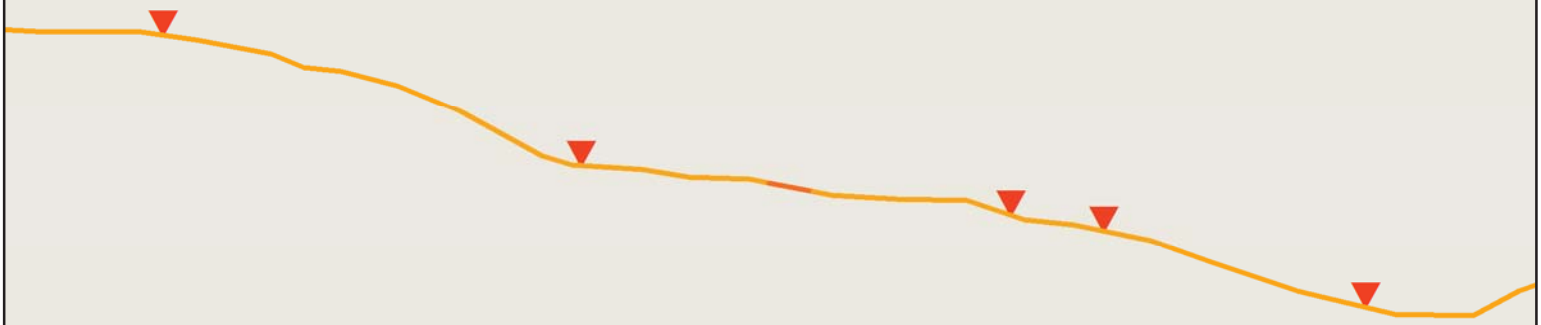
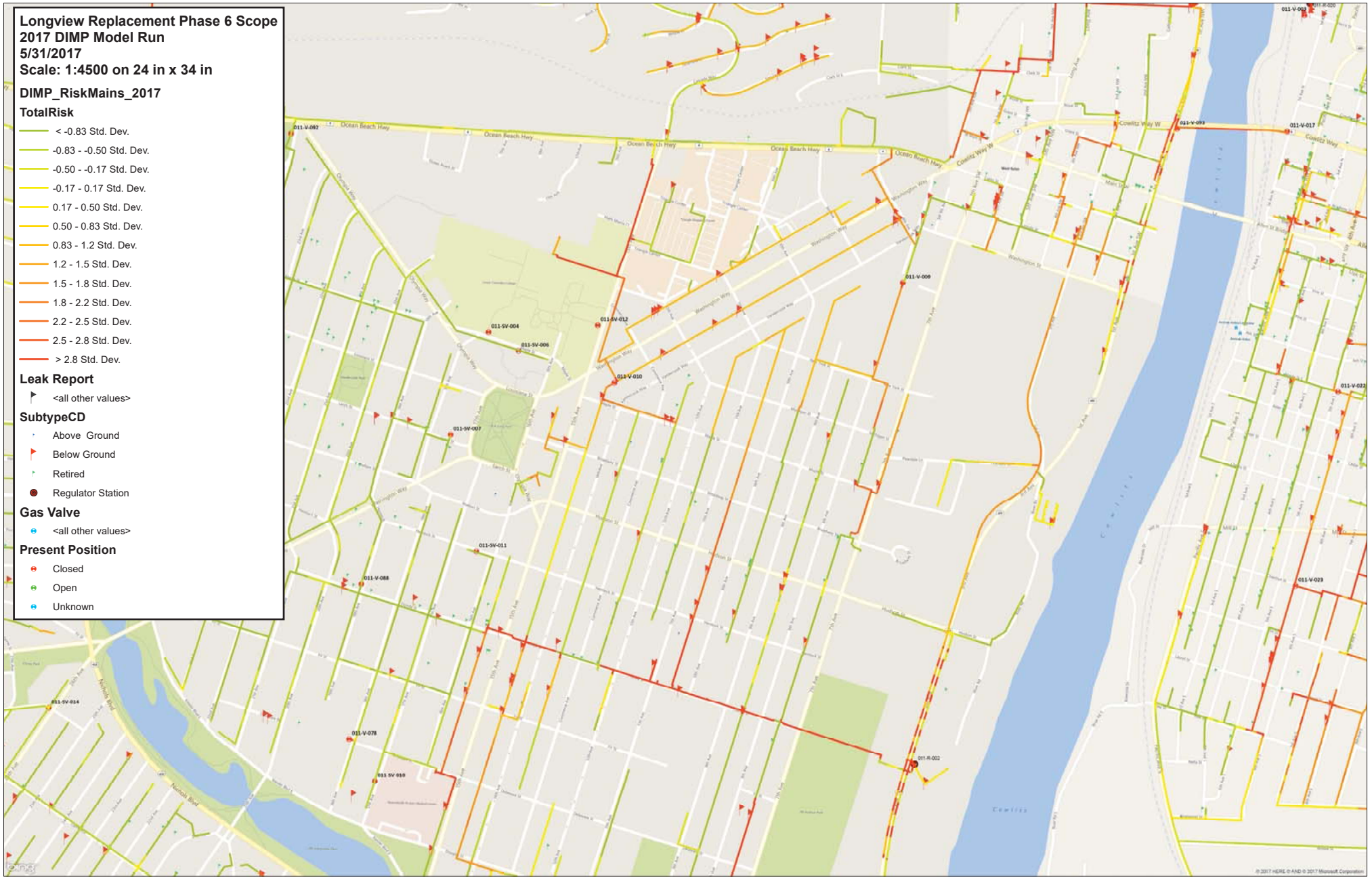
© 2010 NAVTEQ © AND © 2016 Microsoft Corporation

8" Vance Creek Exposure Replacement




Longview Replacement Phase 6 Scope
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Below Ground
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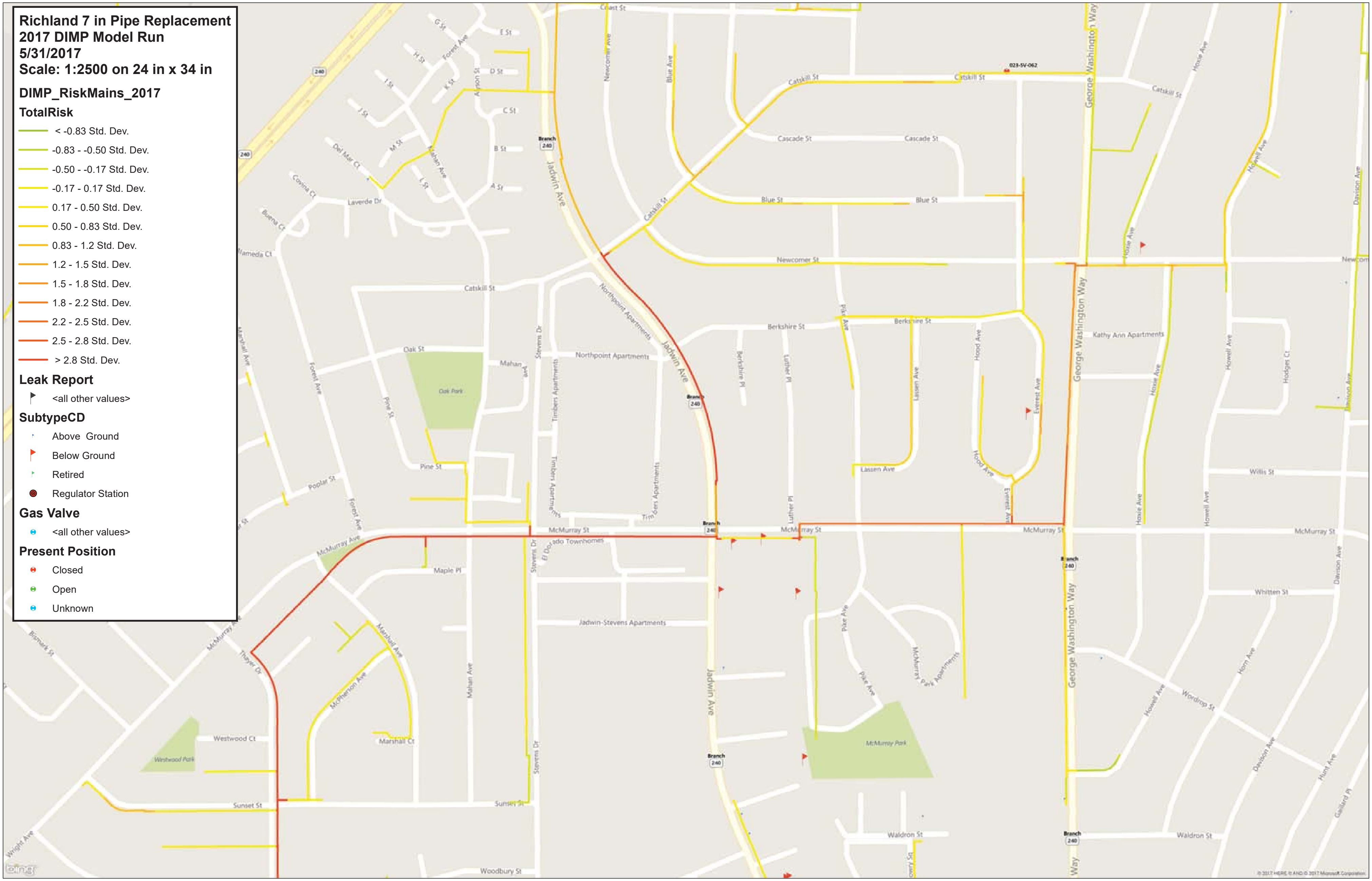
Cowlitz


Richland 7 in Pipe Replacement
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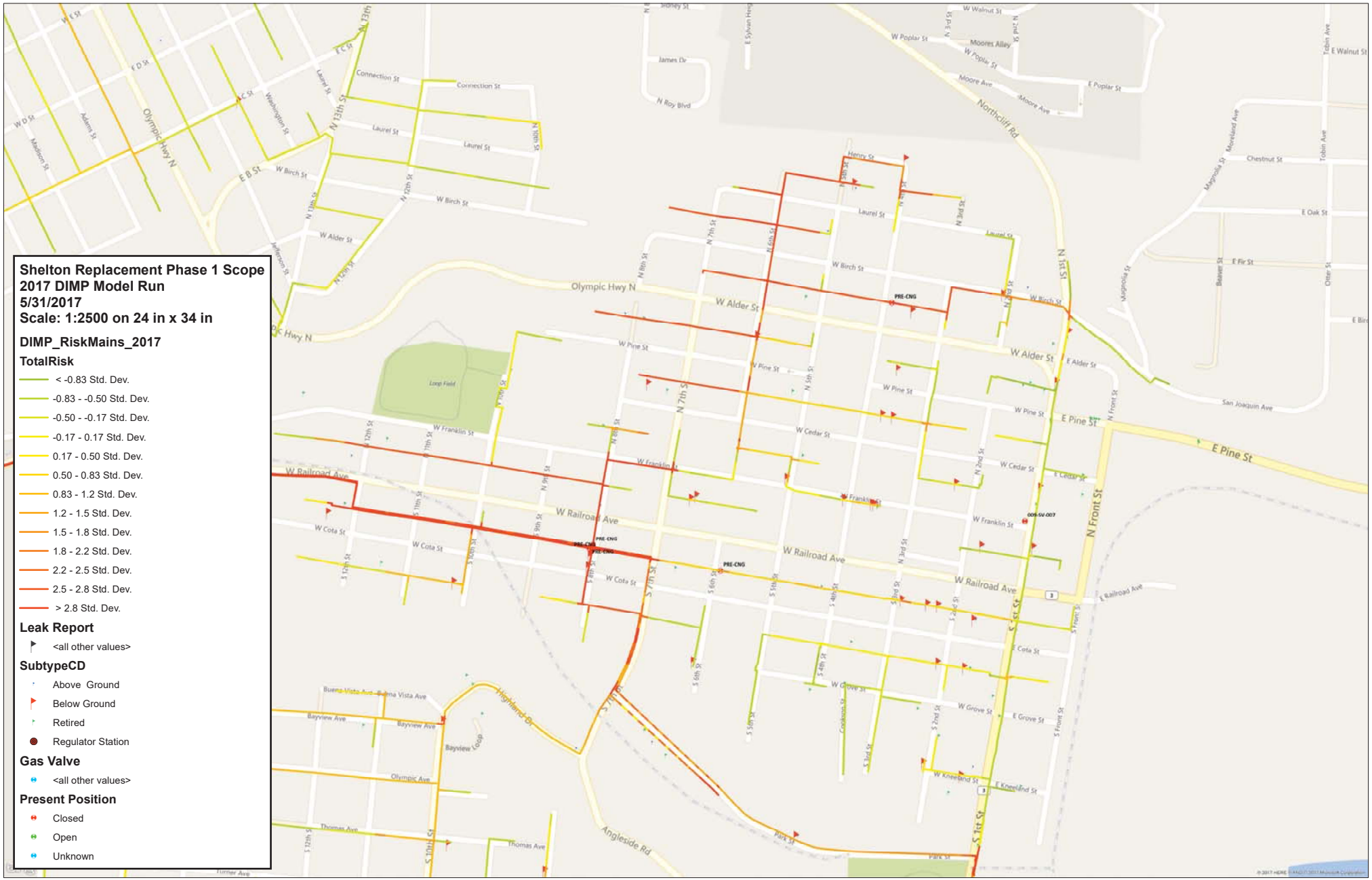
Shelton Replacement Phase 1 Scope
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> 2.8 Std. Dev.
Leak Report
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SubtypeCD
Above Ground
Below Ground
Retired
Regulator Station
Gas Valve
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Present Position
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Open
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W Alder St
E Pine St
W Railroad Ave
N Front St
W Cota St
W Franklin St
W Cedar St
W Birch St
Laurel St
Connection St
Northcliff Rd
Angleside Rd
Highland Dr
Bayview Ave
Bayview Loop
Olympic Ave
Thomas Ave
Park St
W Grove St
E Grove St
W Kneeland St
E Kneeland St
San Joaquin Ave
Loop Field
PRE-CNG
OOS-SV-007

Vance Creek Exposure Replacement
2017 DIMP Model Run
5/31/2017
Scale: 1:4000 on 24 in x 34 in

DIMP_RiskMains_2017

TotalRisk

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- 2.2 - 2.5 Std. Dev.
- 2.5 - 2.8 Std. Dev.
- > 2.8 Std. Dev.

Leak Report

- <all other values>

SubtypeCD

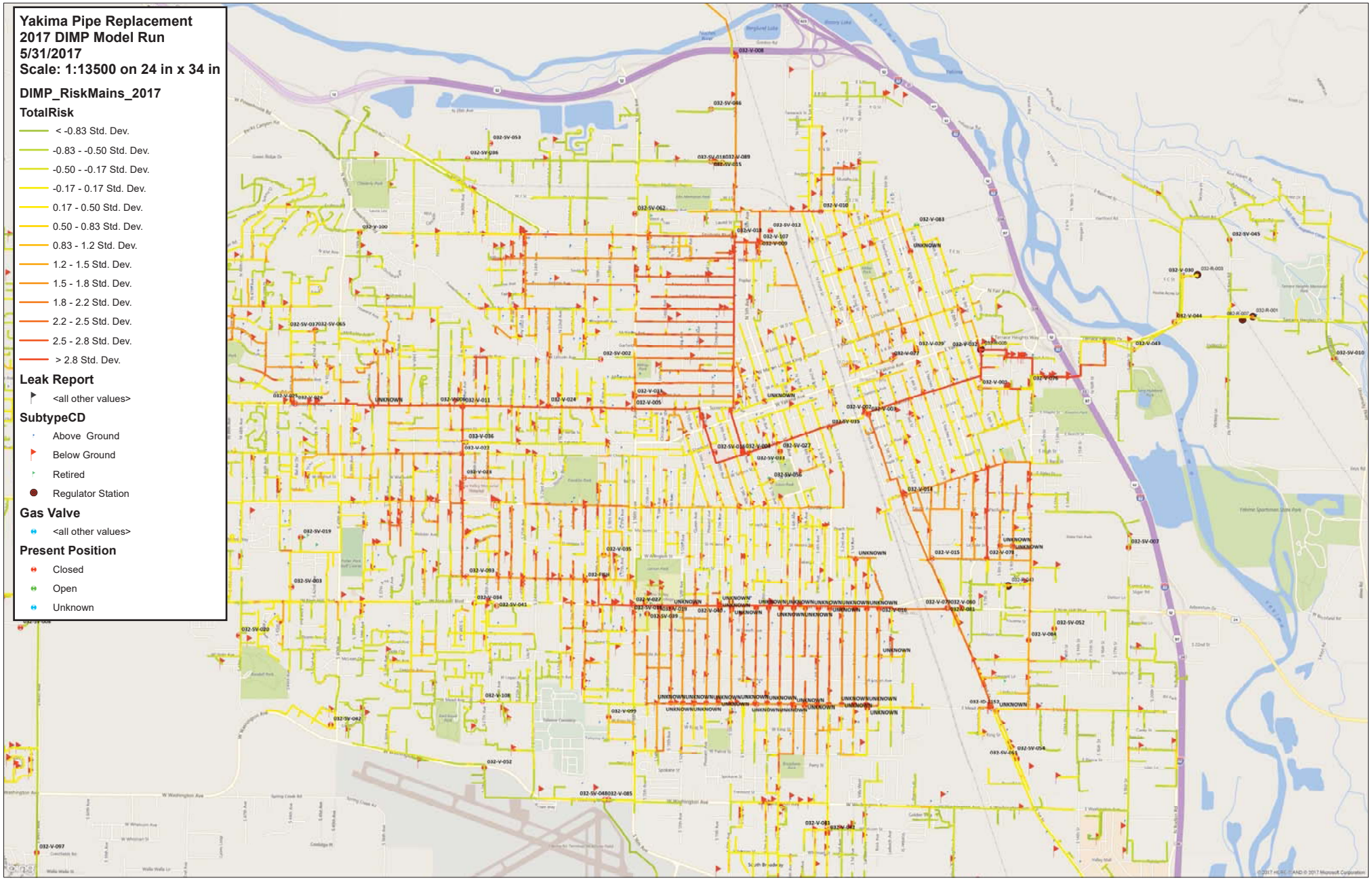
- Above Ground
- Below Ground
- Retired
- Regulator Station

Gas Valve

- <all other values>

Present Position

- Closed
- Open
- Unknown


Yakima Pipe Replacement
2017 DIMP Model Run
5/31/2017
Scale: 1:13500 on 24 in x 34 in
DIMP_RiskMains_2017
TotalRisk
< -0.83 Std. Dev.
-0.83 - -0.50 Std. Dev.
-0.50 - -0.17 Std. Dev.
-0.17 - 0.17 Std. Dev.
0.17 - 0.50 Std. Dev.
0.50 - 0.83 Std. Dev.
0.83 - 1.2 Std. Dev.
1.2 - 1.5 Std. Dev.
1.5 - 1.8 Std. Dev.
1.8 - 2.2 Std. Dev.
2.2 - 2.5 Std. Dev.
2.5 - 2.8 Std. Dev.
> 2.8 Std. Dev.
Leak Report
<all other values>
SubtypeCD
Above Ground
Below Ground
Retired
Regulator Station
Gas Valve
<all other values>
Present Position
Closed
Open
Unknown