

# Report on Hydraulic Analysis of the Morningside Alternative

Stetson Engineers Inc.

May 2, 2018

## Introduction

This report documents the hydraulic analysis and assessment of the Morningside Alternative for flood risk management of Sleepy Hollow Creek. The assessment considered both project effects and cumulative effects in conjunction with other foreseeable projects<sup>1</sup> with regard to flooding.

The Morningside Alternative consists of the following measures:

- Removal of Morningside Bridge;
- Replacement of Mountain View Bridge; and
- Construction of Sunnyside passive detention basin (DB).

Stetson prepared a conceptual design for the Mountain View replacement bridge in November 2016 and for the Sunnyside passive DB<sup>2</sup> in January 2018. The design for the Mountain View replacement bridge would create a bigger opening and raise the bridge soffit from the existing elevation 76.9 ft to 78.3 ft NAVD88. Refer to Attachment A for the conceptual design. The approximate flood magnitude when the water surface elevation reaches the new soffit in terms of recurrence interval is about the 9-year flood.

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<sup>1</sup> The foreseeable projects here are the same foreseeable projects as in other reports related to the San Anselmo Flood Risk Management Project except no Building Bridge #2 removal. Specifically, the foreseeable projects here include the following projects:

- Azalea Avenue Bridge Replacement;
- Madrone Avenue Bridge Replacement;
- Nokomis Avenue Bridge Replacement;
- Sycamore Avenue/Center Boulevard Bridge Replacement;
- Bridge Avenue Bridge Replacement;
- Winship Avenue Bridge Replacement; and
- Unit 4 Measures 1, 2, and 3 in Stetson's 2008 Letter Report to the Corps.

<sup>2</sup> The Sunnyside passive DB was designed with no creek diversion structure. The side weir along the left bank of the creek was designed to have a crest elevation of 228 ft NAVD88. This elevation is the water surface elevation in the creek at the DB site at the time of incipient flooding downstream in Fairfax. In other words, at the time when downstream incipient flooding occurs, a portion of flood water would begin to passively enter into the DB over the side weir. The Sunnyside passive DB would have an east berm top elevation of 232 ft NAVD88 and a storage capacity of about 20 acre-ft at the simulated 100-year maximum water surface elevation (229.9 ft NAVD88).

A 36-inch diameter low-level drain outlet pipe with an invert elevation at about 223.8 ft NAVD88 was designed to drain the detention basin. Under this concept, the designed 36-inch diameter low-level outlet pipe would be kept open at all times.

## Hydraulic Modeling for the Morningside Alternative

Stetson performed hydraulic modeling to assess the project effects and cumulative effects of the Morningside Alternative with regard to flooding. For the modeling, Stetson used US Army Corps of Engineers software, HEC-RAS version 5.0, which has combined 1D and 2D hydraulic modeling capabilities. Stetson recently developed a combined 1D/2D unsteady-flow model application for the Corte Madera Creek watershed. The model starts from the bay and extends upstream along the mainstream and tributaries (including the Sleepy Hollow Creek) to the proposed upper watershed detention basins in Fairfax that are currently under environmental review. The model was calibrated to the 12/15/2016 bankfull event and the 12/31/2005 flood event (an approximate 100-year flood), and verified to the 1/4/1982 flood event (an approximate 150-year flood; Stetson, 2017). The model is undergoing peer review by the US Army Corps of Engineers.

The following three scenarios were analyzed:

- Existing Conditions (EC), to serve as the “Baseline” basis for comparison
- Morningside Alternative added to EC, to assess “Project” effects
- Morningside Alternative + Foreseeable Projects added to EC, to assess “cumulative” effects

For each scenario, the following three flood events were analyzed:

- Q100, major, rare flood, similar to 12/31/05 flood
- Q25, moderate, infrequent flood
- Q10, minor flood, less frequent than 2017 flood event (7-year flood event)

### Results of Hydraulic Analysis in Terms of Floodplain Inundation

Figures 1a to 1d show the changes in the HEC-RAS model-simulated floodplain inundation extent and depth between Morningside Alternative and existing conditions for the 10-year flood. Figures are provided covering Fairfax, Sleepy Hollow, Upper San Anselmo, and Lower San Anselmo areas. Similarly, Figures 2a to 2d show the model-simulated results for the 25-year flood and Figure 3a to 3d for the 100-year flood.

Figures 4a to 4d show the changes in the HEC-RAS model-simulated floodplain inundation extent and depth between Morningside Alternative + Foreseeable Projects and existing conditions for the 10-year flood. Similarly, Figures 5a to 5d show the model-simulated results for the 25-year flood and Figures 6a to 6d for the 100-year flood.

Table 1 is a summary of results for Morningside Alternative and Table 2 is a summary of results for Morningside Alternative + Foreseeable Projects.

The Morningside Alternative alone would slightly increase flooding in the Downtown SA area during the 25-year (see Figures 1c and 1d). But the Morningside Alternative + the Foreseeable Projects would mitigate for the slight increase in flooding caused by Morningside Alternative alone.

**Table 2 Summary of Benefits of Morningside Alternative verses Existing Condition**

<b>Figure No.</b>	<b>Flow Condition</b>	<b>Location</b>	<b>Summary of Benefits</b>	<b>Any Flooding Increase?</b>
Figure 1a	Q10	Fairfax	<ul style="list-style-type: none"> <li>• Reduces inundation extent due to Sunnyside passive DB</li> <li>• Reduces inundation depth by up to 13 inches</li> </ul>	None
Figure 1b		Sleepy Hollow	<ul style="list-style-type: none"> <li>• Reduces inundation extent due to Morningside measures</li> <li>• Reduces inundation depth by up to 28 inches</li> </ul>	Slightly increases flooding in the area near Sorich Creek confluence
Figure 1c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>• No effect</li> </ul>	Slightly increases flooding in the area near Sorich Creek confluence
Figure 1d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>• No effect</li> </ul>	None
Figure 2a	Q25	Fairfax	<ul style="list-style-type: none"> <li>• Nearly zero reduction in inundation extent</li> <li>• Reduces inundation depth by up to 2 inch</li> </ul>	None
Figure 2b		Sleepy Hollow	<ul style="list-style-type: none"> <li>• Reduces inundation extent due to Morningside measures</li> <li>• Reduces inundation depth by up to 24 inches</li> </ul>	Slightly increases flooding in the area below Mountain View replacement bridge and in the area between Sleepy Hollow Creek and Sorich Creek
Figure 2c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>• Nearly zero effect in inundation extent</li> </ul>	Slightly increases flooding in the upper Down SA area
Figure 2d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>• Nearly zero effect in inundation extent</li> </ul>	Slightly increases flooding in the lower Down SA area
Figure 3a	Q100	Fairfax	<ul style="list-style-type: none"> <li>• No effect</li> </ul>	None
Figure 3b		Sleepy Hollow	<ul style="list-style-type: none"> <li>• Nearly zero reduction in inundation extent</li> <li>• Reduces inundation depth by up to 7 inch</li> </ul>	Slightly increases flooding in the area below Mountain View replacement bridge
Figure 3c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>• No effect</li> </ul>	None
Figure 3d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>• No effect</li> </ul>	None

**Table 3 Summary Benefits of Morningside Alternative + Foreseeable Projects verses Existing Condition**

<b>Figure No.</b>	<b>Flow Condition</b>	<b>Location</b>	<b>Summary of Results</b>	<b>Any Increased Flooding?</b>
Figure 4a	Q10	Fairfax	<ul style="list-style-type: none"> <li>Reduces inundation extent due to Sunnyside passive DB</li> <li>Reduces inundation depth by up to 13 inches</li> </ul>	None
Figure 4b		Sleepy Hollow	<ul style="list-style-type: none"> <li>Reduces inundation extent due to Morningside measures</li> <li>Reduces inundation depth by up to 28 inches</li> </ul>	None
Figure 4c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>Reduces inundation extent due to replacements of Nokomis, Madrone, Center and Bridge Ave Bridges.</li> <li>Reduces inundation depth by up to 26 inches</li> </ul>	None
Figure 4d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>Reduces inundation extent due to replacements of Center and Bridge Ave Bridges.</li> <li>Reduces inundation depth by up to 16 inches</li> </ul>	None
Figure 5a	Q25	Fairfax	<ul style="list-style-type: none"> <li>Reduces inundation extent due to replacement of Azalea Bridge</li> <li>Reduces inundation depth by up to 27 inches</li> </ul>	None
Figure 5b		Sleepy Hollow	<ul style="list-style-type: none"> <li>Reduces inundation extent due to Morningside measures</li> <li>Reduces inundation depth by up to 24 inches</li> </ul>	Slightly increases flooding in the area below Mountain View replacement bridge
Figure 5c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>Reduces inundation extent</li> <li>Reduces inundation depth by up to 20 inches</li> </ul>	None
Figure 5d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>Nearly no effect</li> </ul>	Slightly increases flooding in the area below Winship replacement bridge
Figure 6a	Q100	Fairfax	<ul style="list-style-type: none"> <li>Reduces inundation extent due to replacement of Azalea Bridge</li> <li>Reduces inundation depth by up to 14 inches</li> </ul>	None
Figure 6b		Sleepy Hollow	<ul style="list-style-type: none"> <li>Nearly no effect on inundation extent</li> <li>Reduces inundation depth by up to 7 inches</li> </ul>	Slightly increases flooding in the area below Mountain View replacement bridge
Figure 6c		Downtown SA (Upper)	<ul style="list-style-type: none"> <li>Reduces inundation extent</li> <li>Reduces inundation depth by up to 18 inches</li> </ul>	None
Figure 6d		Downtown SA (Lower)	<ul style="list-style-type: none"> <li>Reduces inundation extent</li> <li>Reduces inundation depth by up to 18 inches</li> </ul>	None

## Results of Hydraulic Analysis in Terms of Channel Water Surface Level

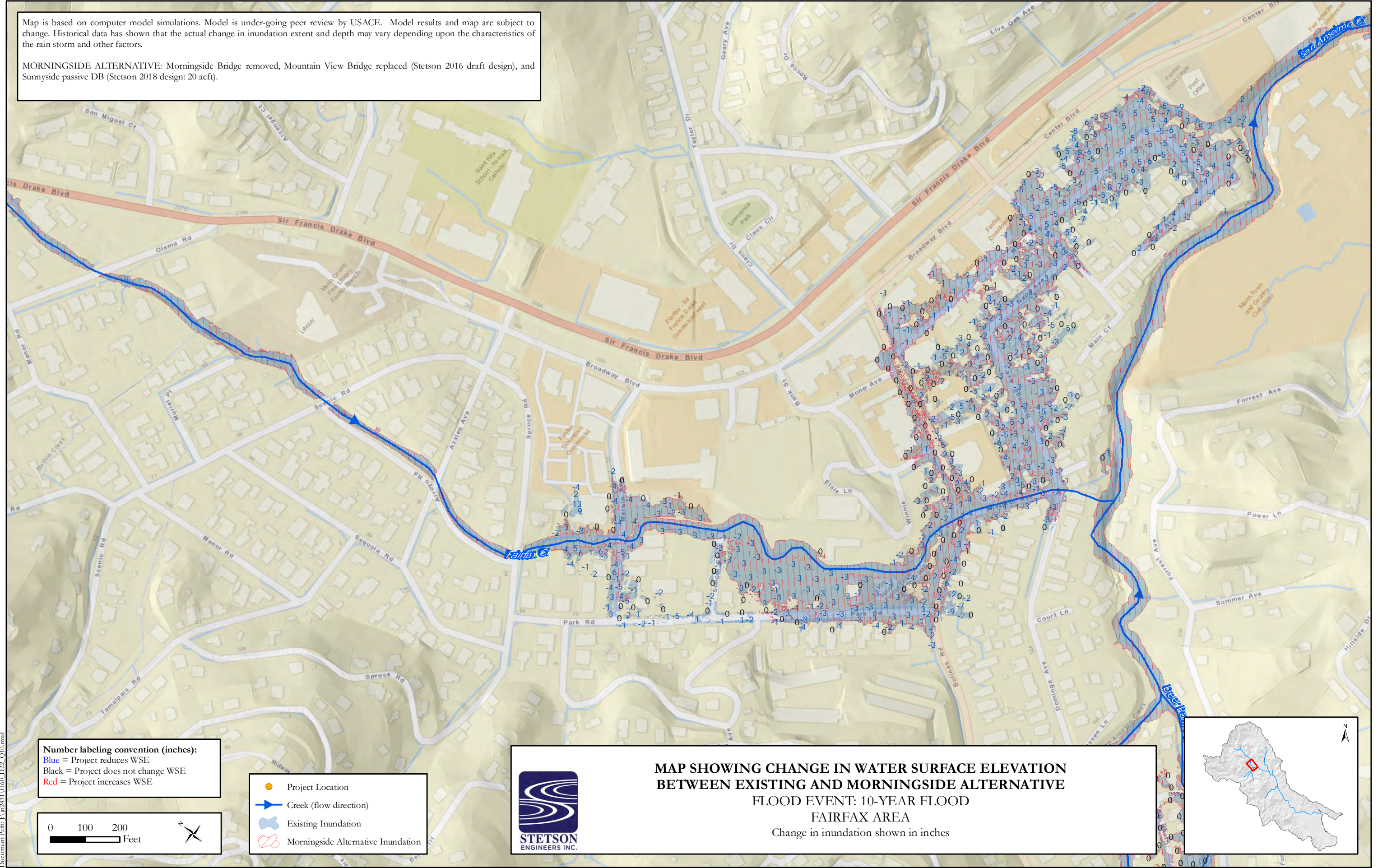
Figures 7a to 7c compare the HEC-RAS model-simulated channel water surface profiles along Fairfax Creek for the 10-year flood, 25-year flood, and 100-year flood, respectively<sup>3</sup>. Similarly, Figures 8a to 8c compare the simulated channel water surface profiles along Sleepy Hollow Creek and Figures 9a to 9c compare the simulated channel water surface profiles along San Anselmo Creek. Each figure includes three water surface profiles: (1) existing condition, (2) after project construction, and (3) after project + Foreseeable Projects construction.

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<sup>3</sup> The Fairfax water surface profile in the 1D in-channel model does not show the creek water surface onto and across Bolinas Ave and down to Sherman Ave. The water surface downstream of the entrance to the Sherman Ave culvert is shown in the 2D floodplain model results (see Figures 1a, 2a, 3a, 4a, 5a, and 6a). This is related to the 1D/2D model configuration. In this HEC-RAS 1D/2D model configuration, a single 2D Flow Area is used for the Fairfax Creek floodplain. This single 2D Flow Area covers the both the right and left floodplains of the creek as well as the ground above the Fairfax (Sherman Ave) culvert. Floodwaters in the right floodplain and left floodplain can have a direct connection/exchange as floodwaters flow over and above the culvert.

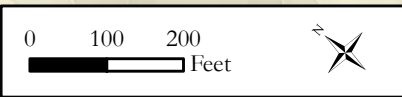
Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).

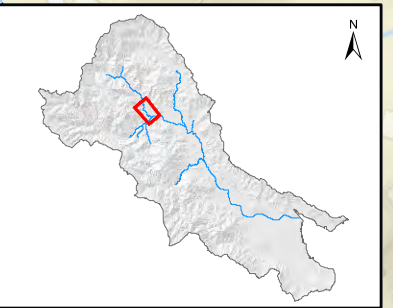


**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
 Black = Project does not change WSE  
 Red = Project increases WSE

- Project Location
- ➔ Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE  
 FLOOD EVENT: 10-YEAR FLOOD  
 FAIRFAX AREA  
 Change in inundation shown in inches**



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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).

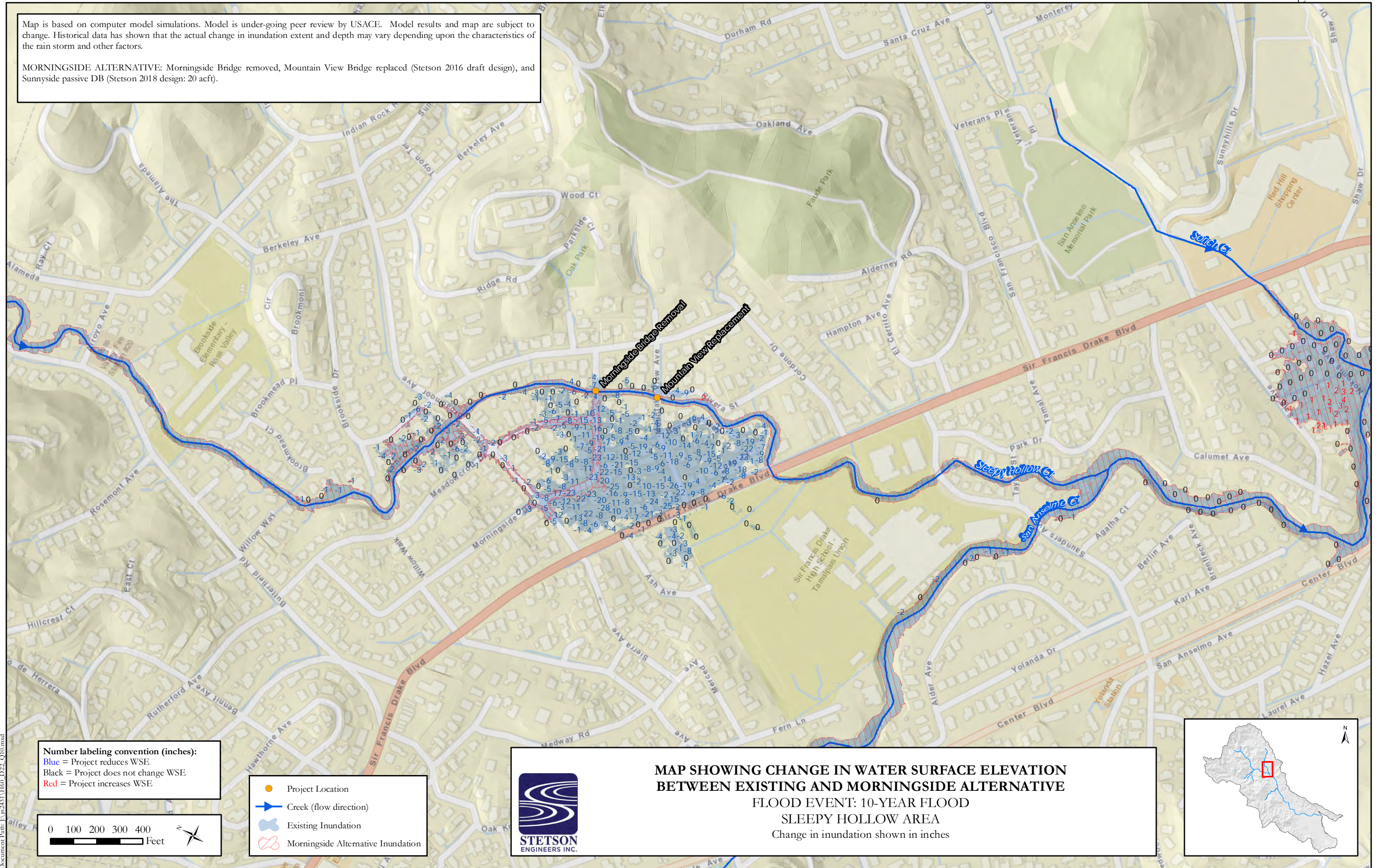
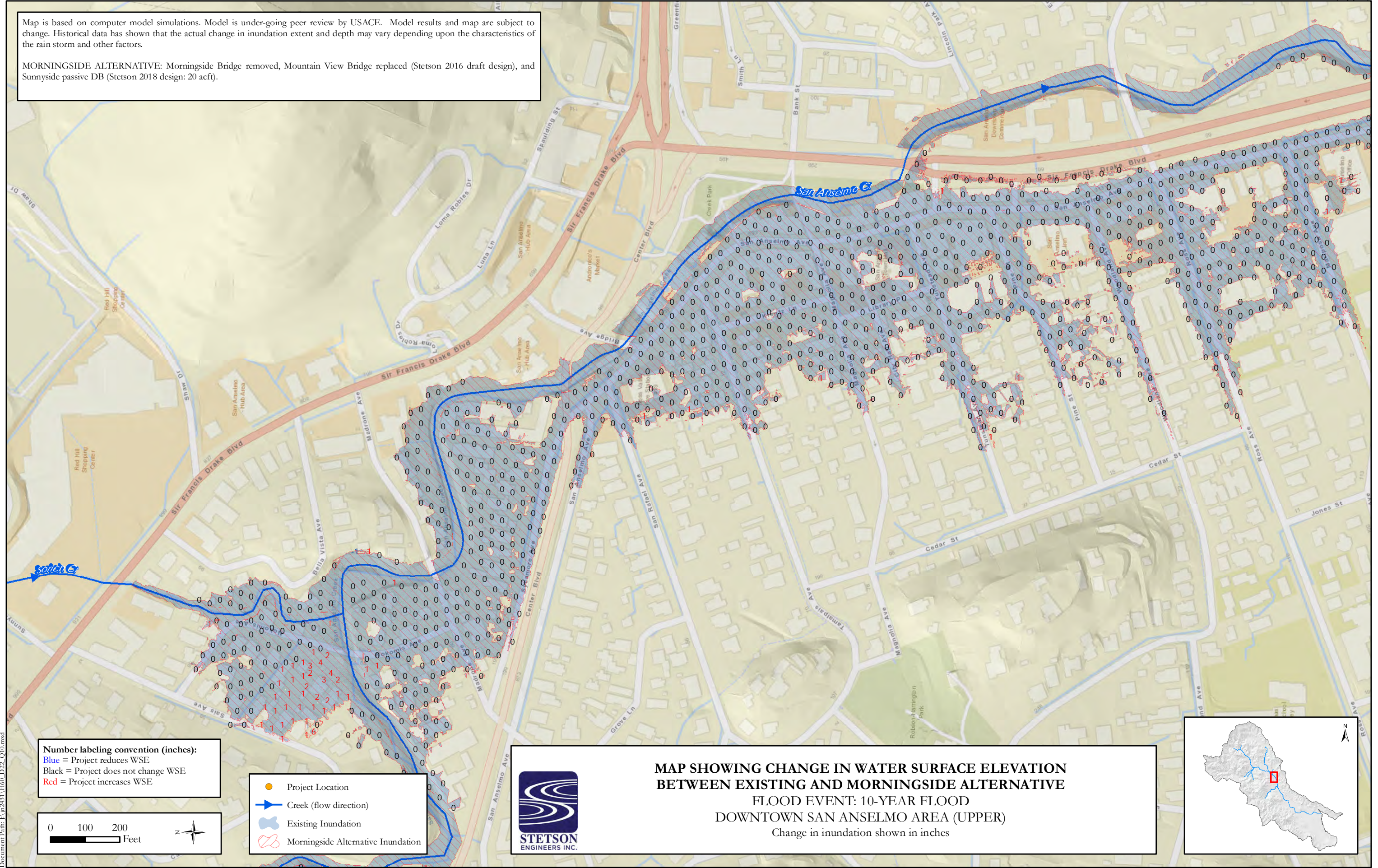


FIGURE 1c - Downtown San Anselmo Area (Upper)

Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
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- Project Location
- Creek (flow direction)
- ▨ Existing Inundation
- ▨ Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 10-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches

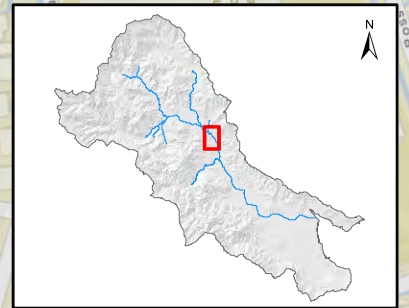
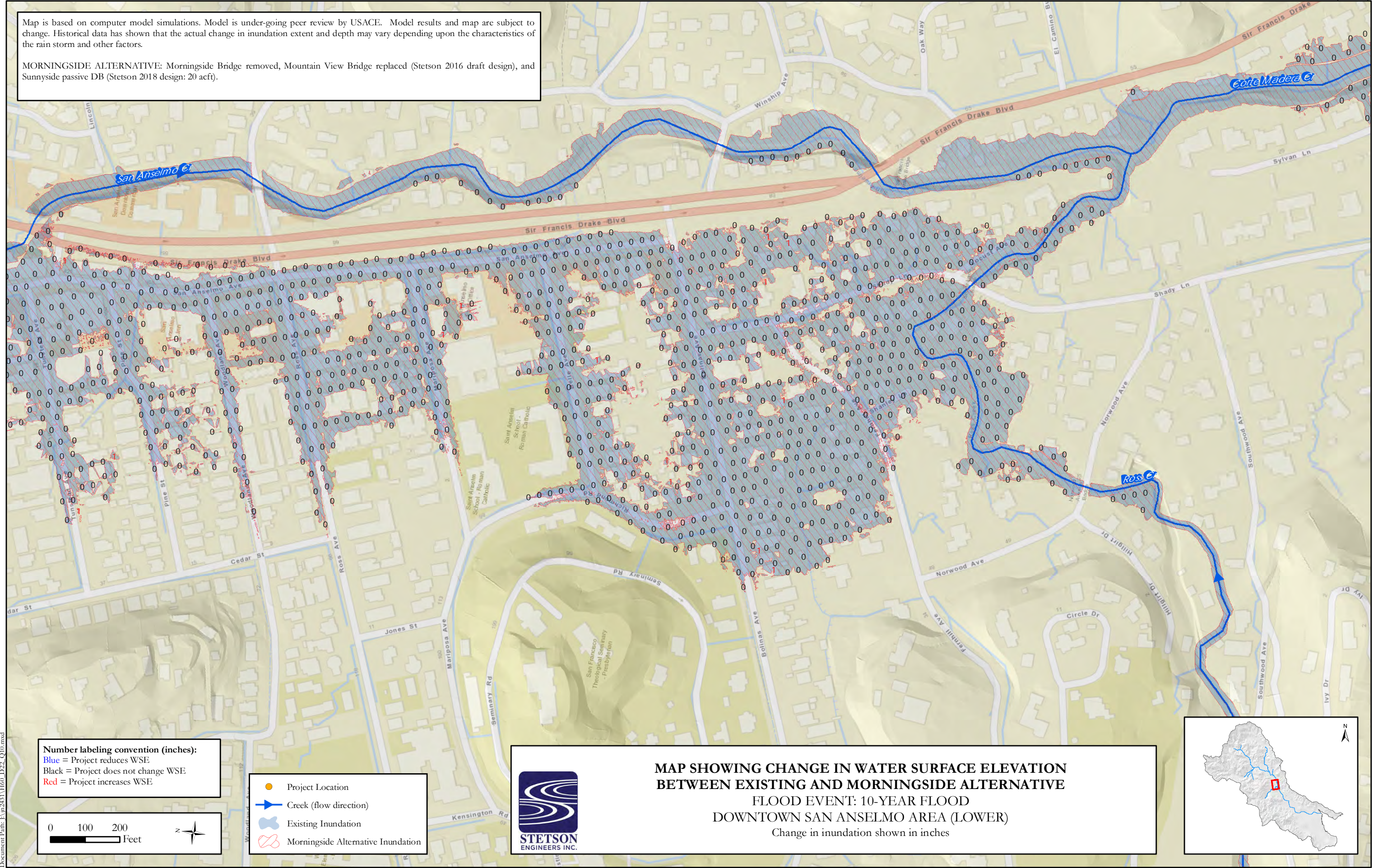




FIGURE 1d - Downtown San Anselmo Area (Lower)

Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.


MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



**Number labeling convention (inches):**  
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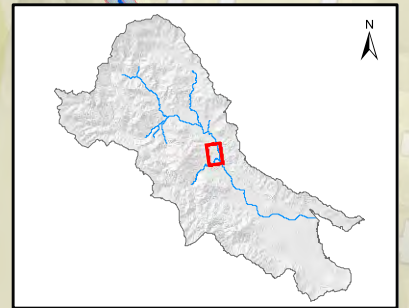
- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**

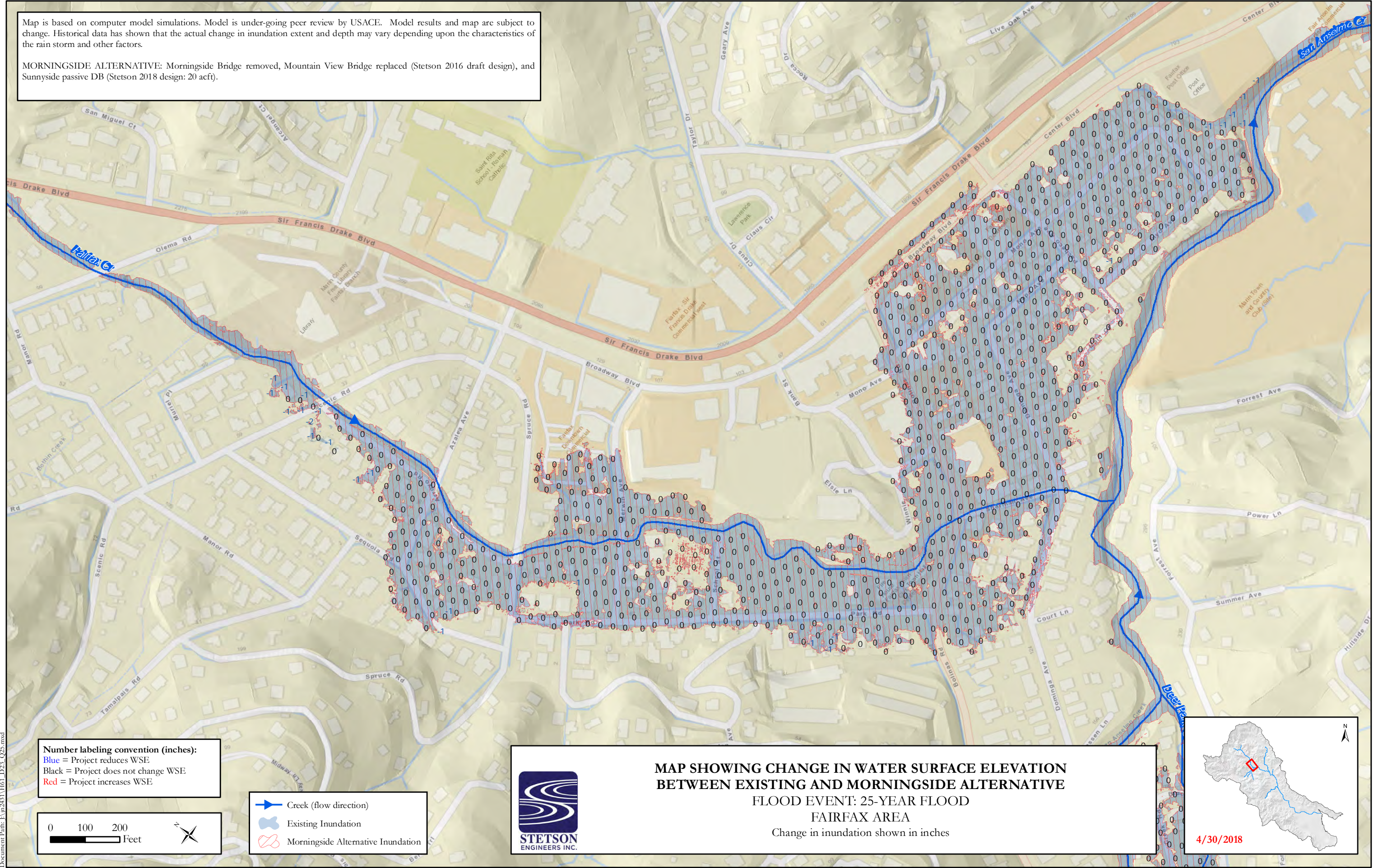
FLOOD EVENT: 10-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (LOWER)

Change in inundation shown in inches

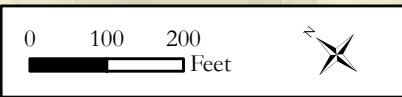


Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



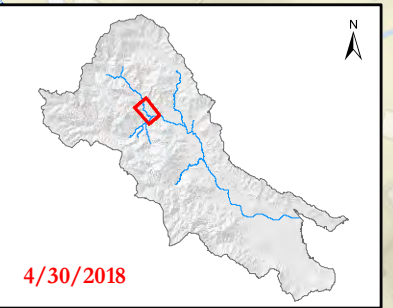
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- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 25-YEAR FLOOD  
 FAIRFAX AREA  
 Change in inundation shown in inches



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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).

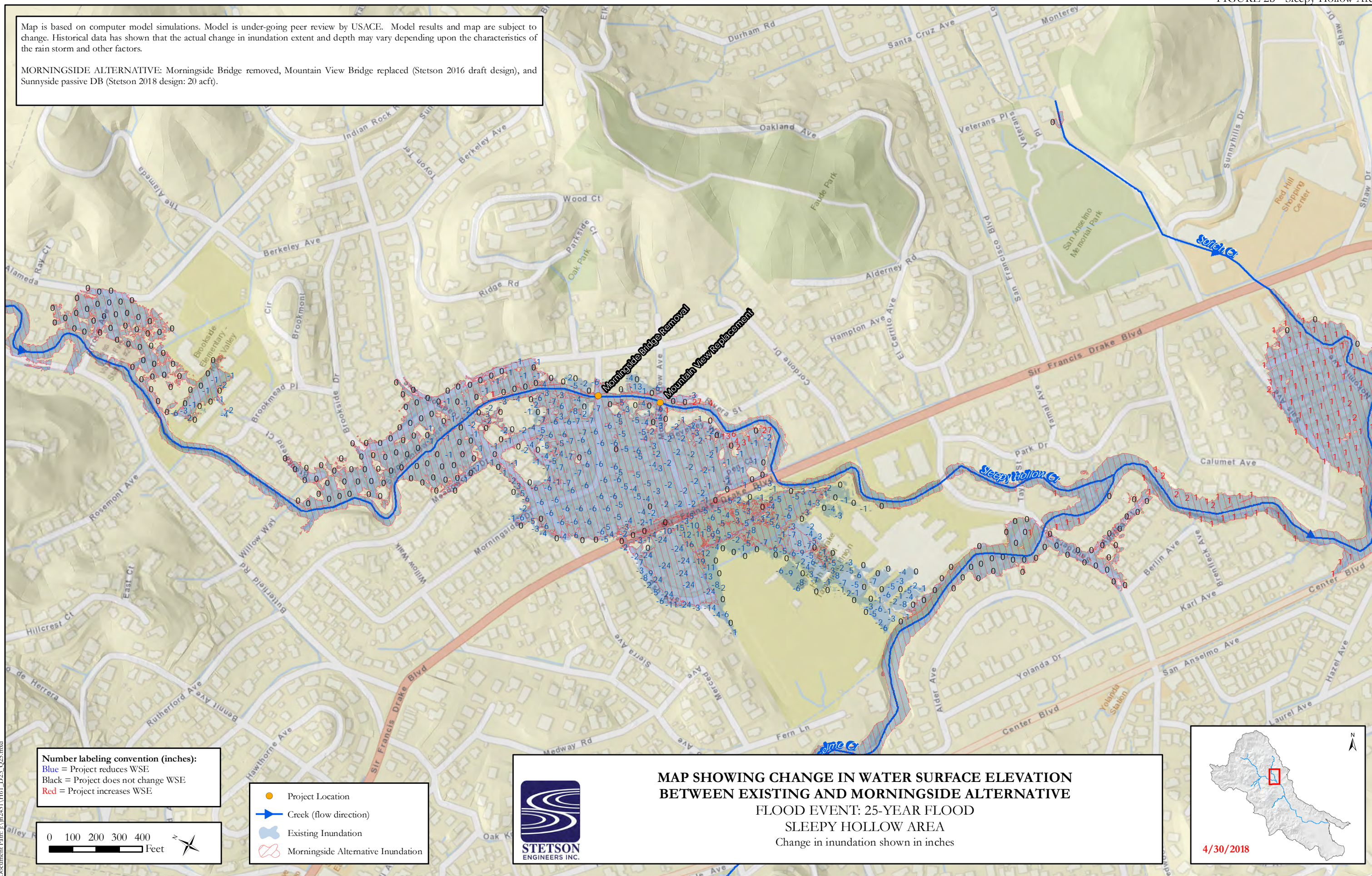
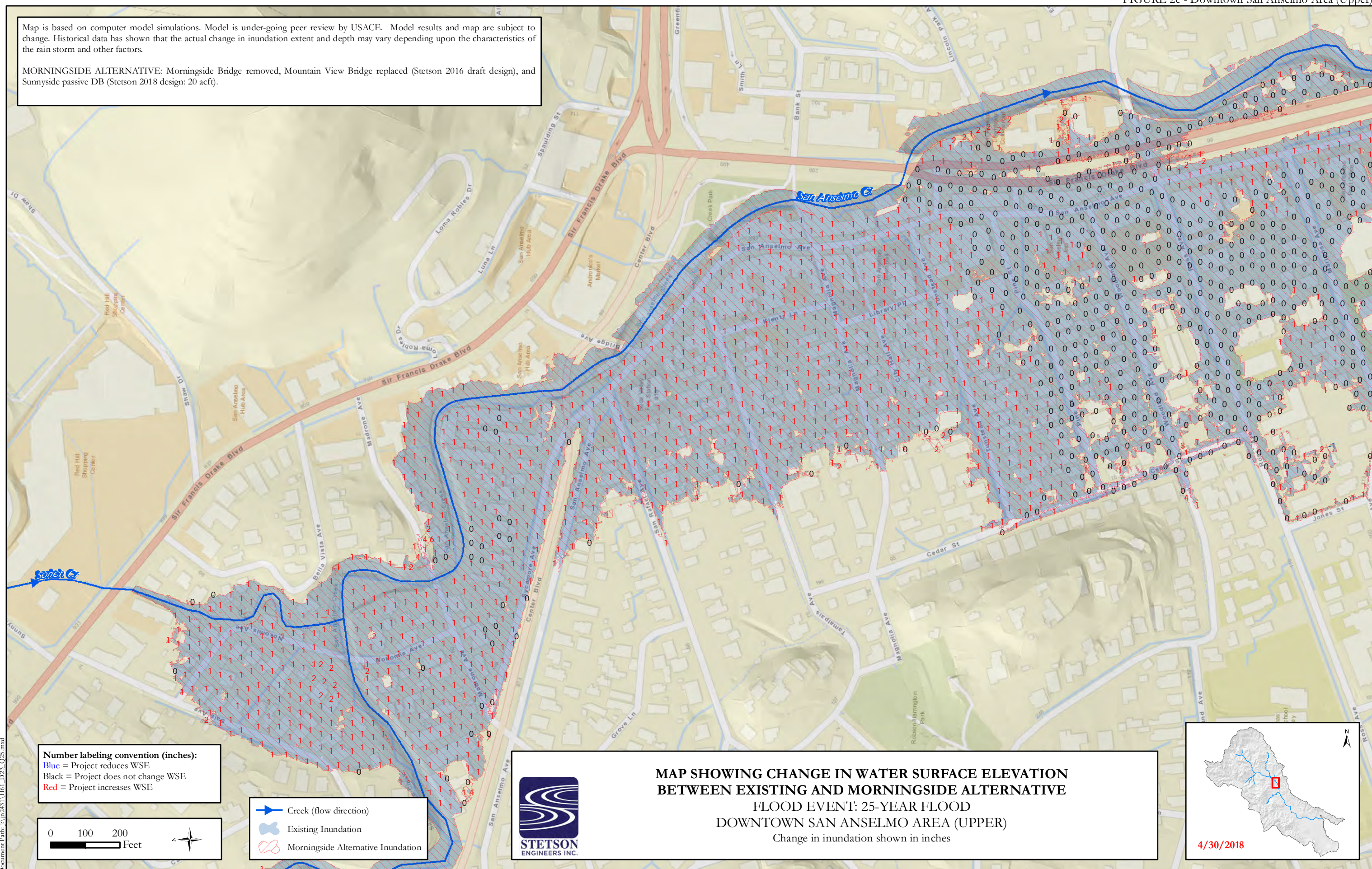


FIGURE 2c - Downtown San Anselmo Area (Upper)

Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



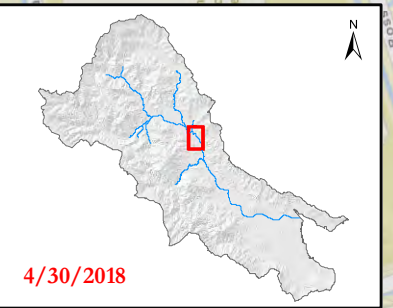
**Number labeling convention (inches):**  
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- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 25-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches

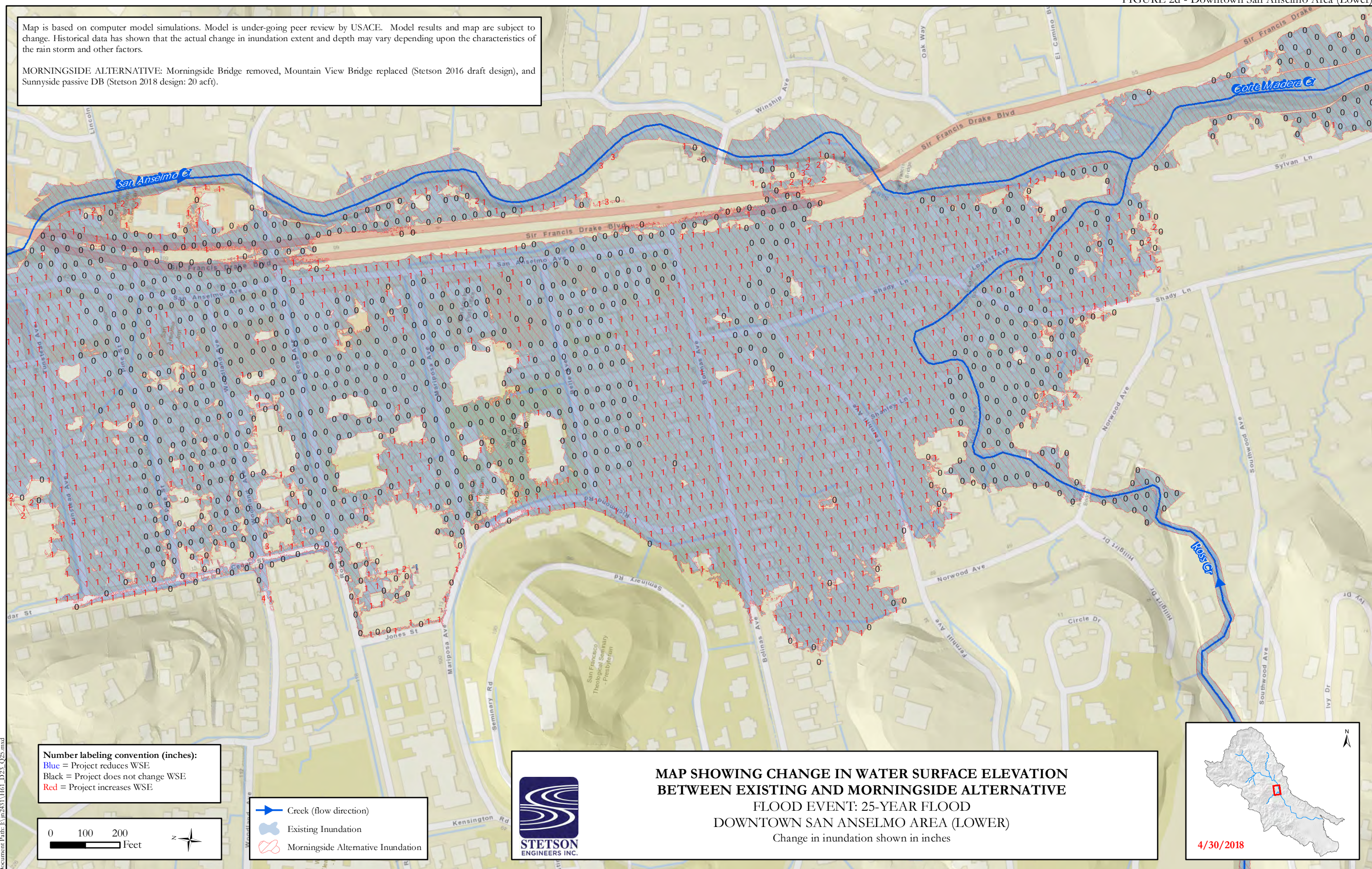


4/30/2018

FIGURE 2d - Downtown San Anselmo Area (Lower)

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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



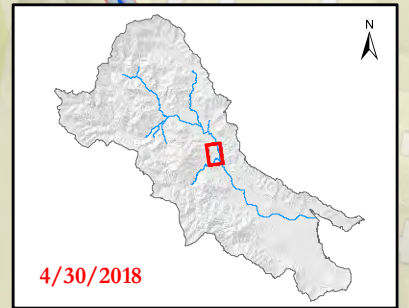
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- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



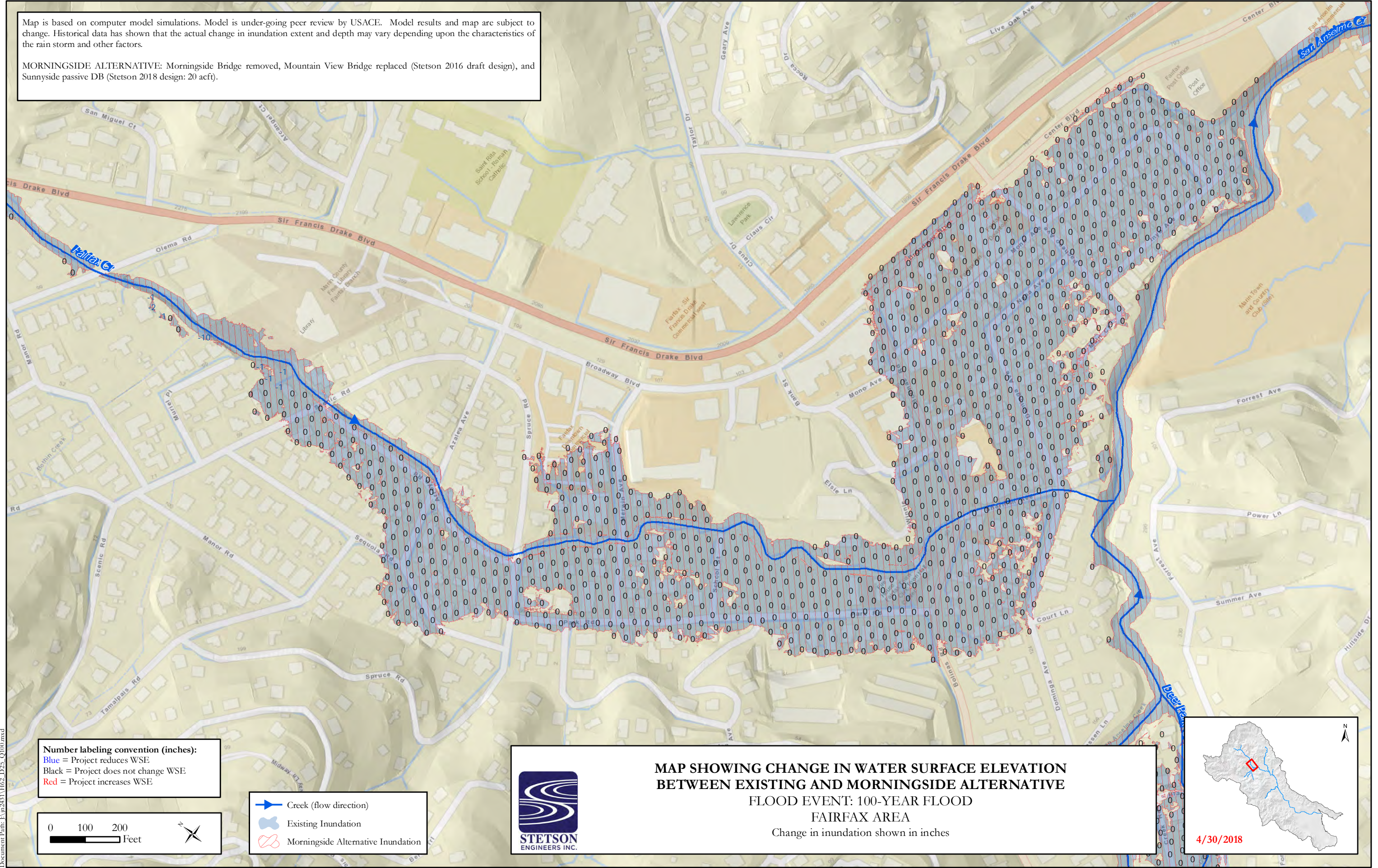
**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 25-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (LOWER)  
 Change in inundation shown in inches



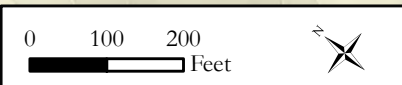
4/30/2018

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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



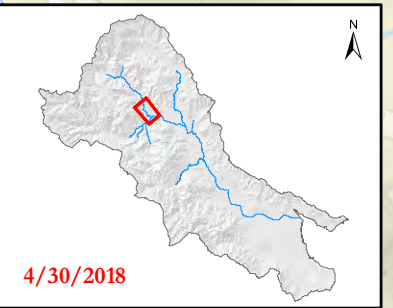
**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
 Black = Project does not change WSE  
 Red = Project increases WSE



- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation

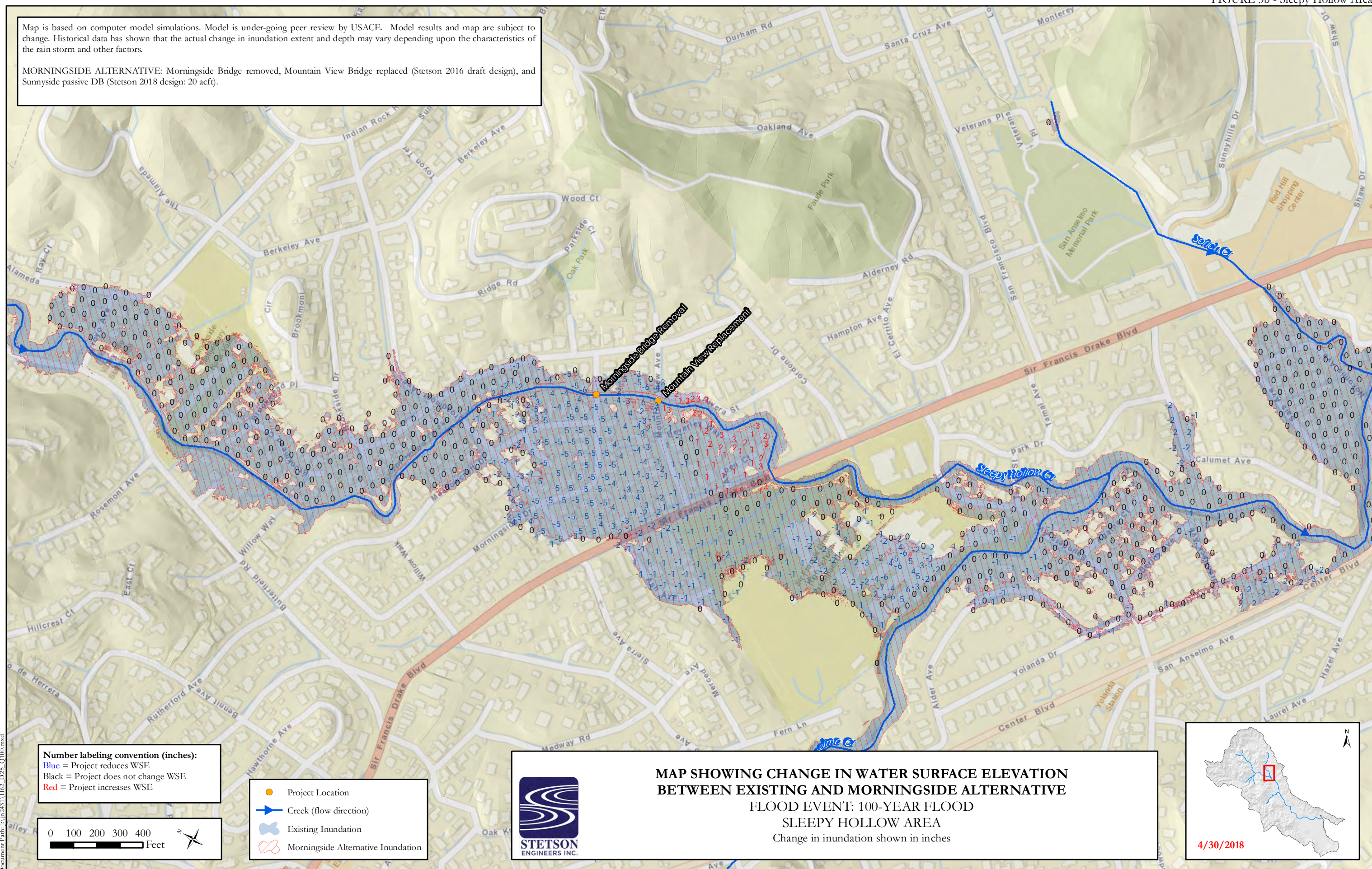


**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 100-YEAR FLOOD  
 FAIRFAX AREA  
 Change in inundation shown in inches

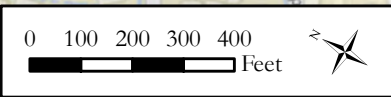


Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



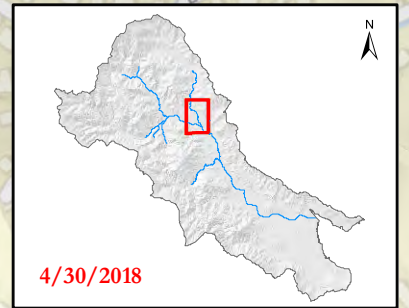
**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation

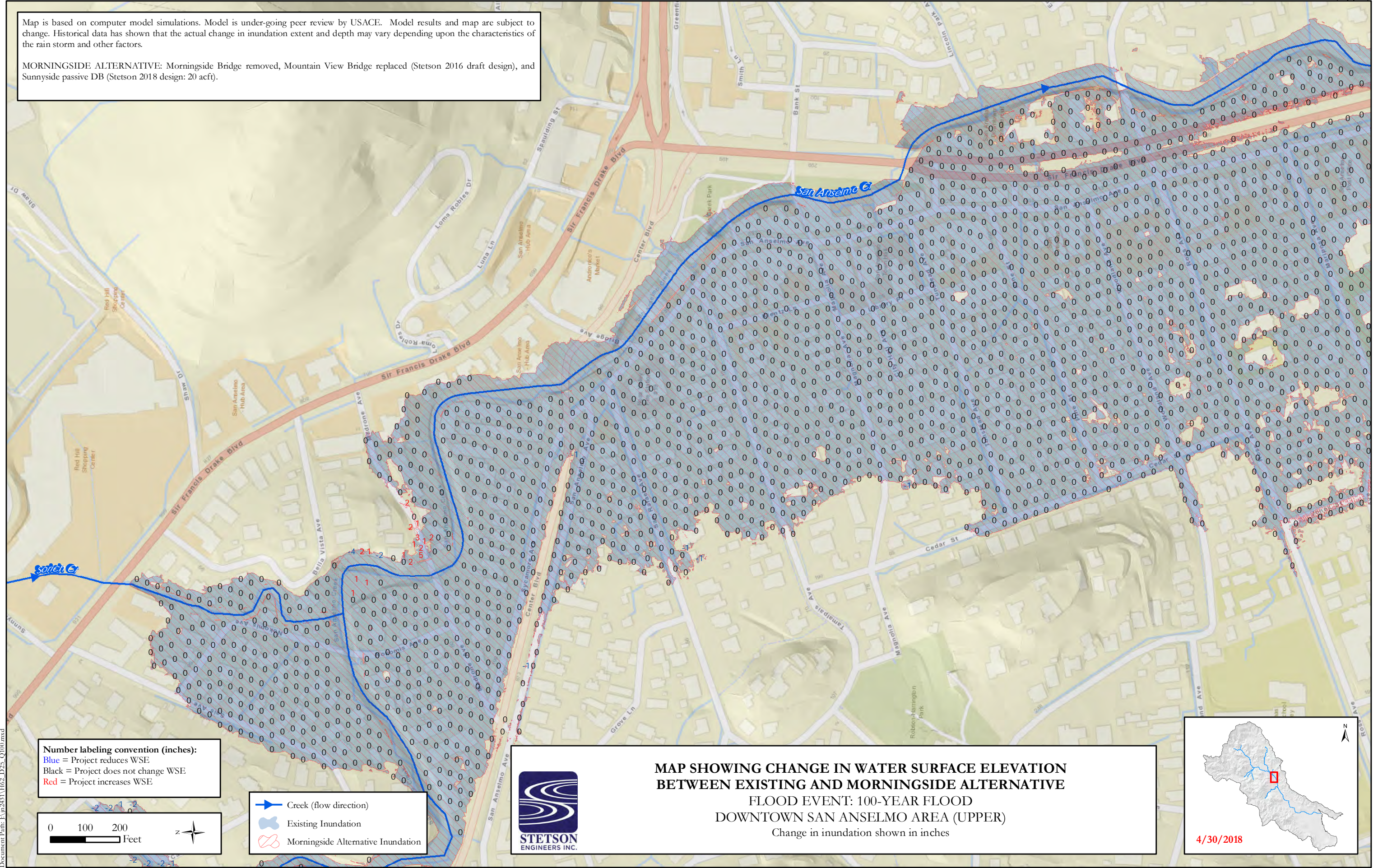


**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 100-YEAR FLOOD  
 SLEEPY HOLLOW AREA  
 Change in inundation shown in inches

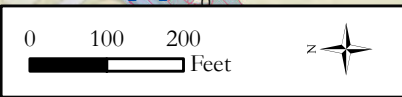


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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



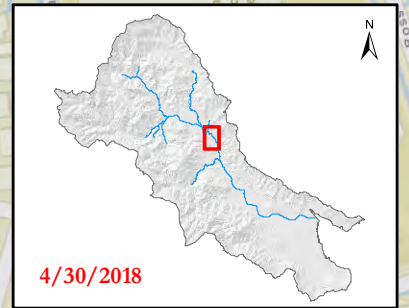
**Number labeling convention (inches):**  
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 Red = Project increases WSE



- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 100-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches



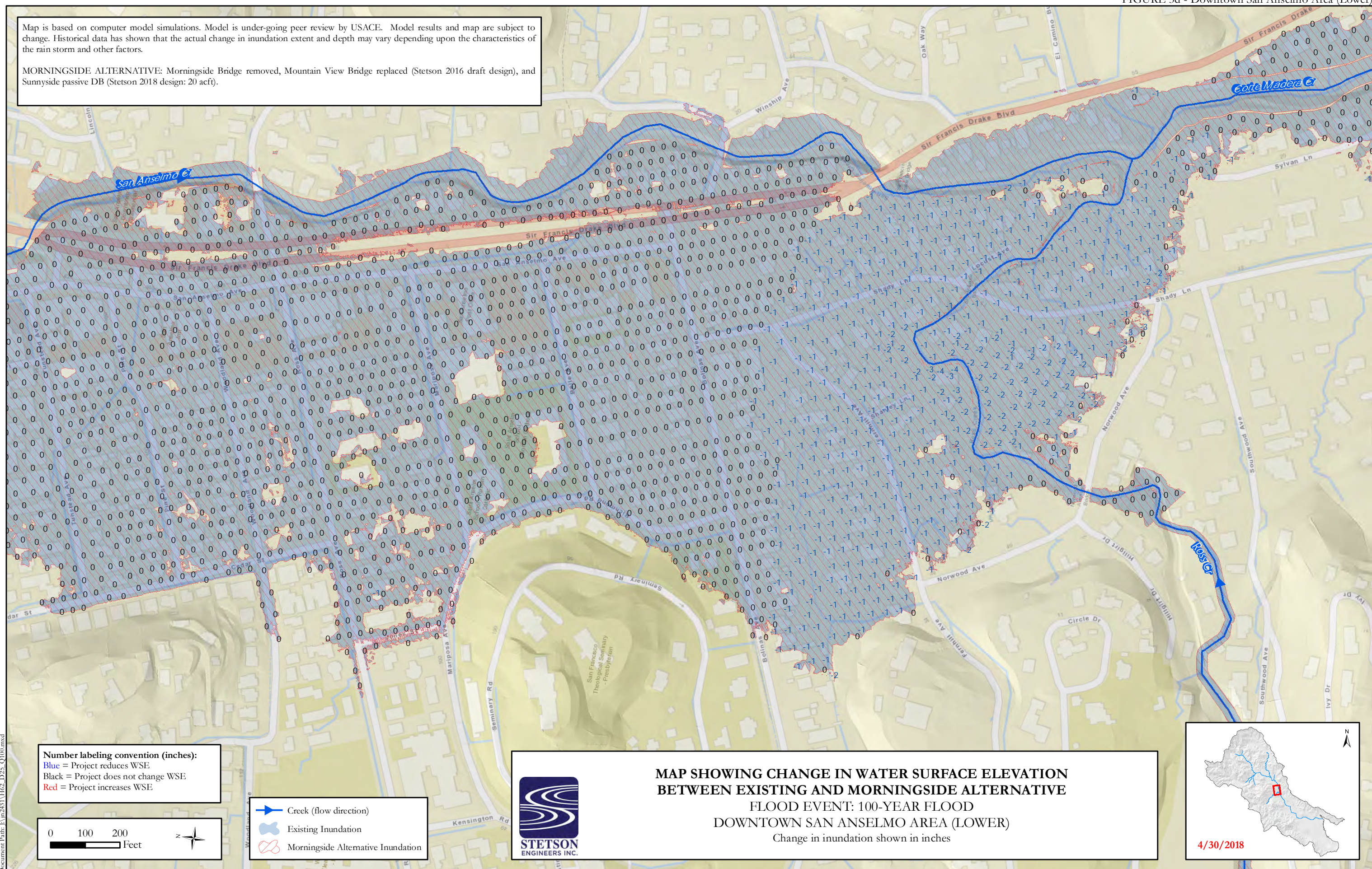
4/30/2018



FIGURE 3d - Downtown San Anselmo Area (Lower)

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MORNINGSIDE ALTERNATIVE: Morningside Bridge removed, Mountain View Bridge replaced (Stetson 2016 draft design), and Sunnyside passive DB (Stetson 2018 design: 20 acft).



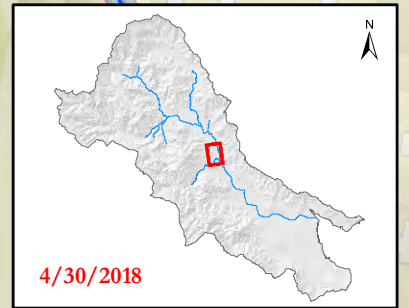
**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
 Black = Project does not change WSE  
 Red = Project increases WSE



- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



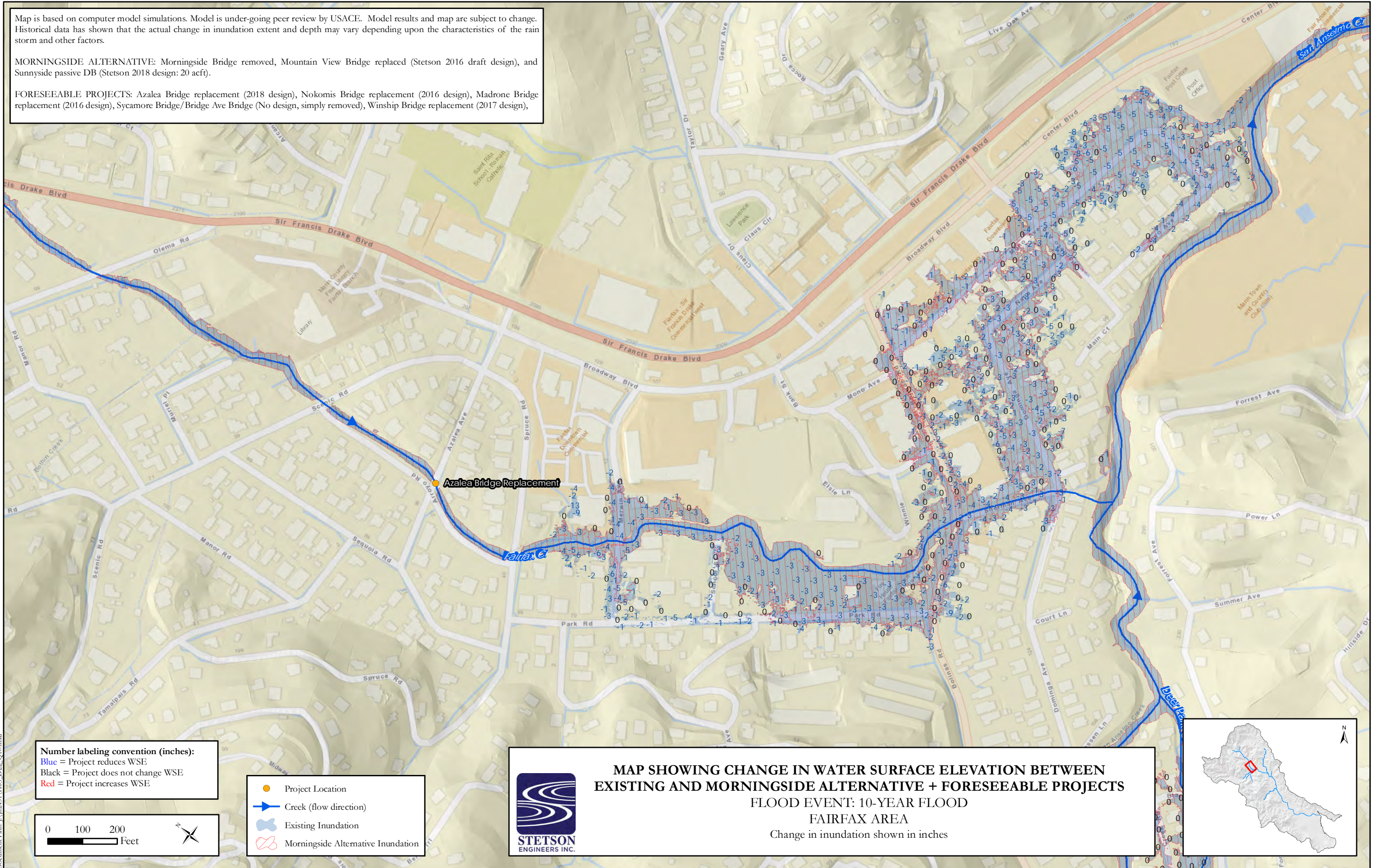
**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION  
 BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE**  
 FLOOD EVENT: 100-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (LOWER)  
 Change in inundation shown in inches



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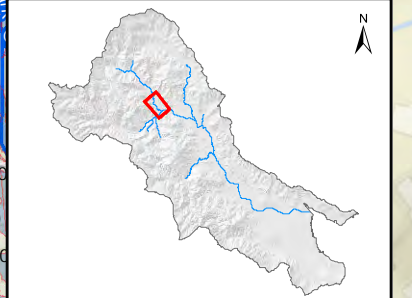


**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
 Black = Project does not change WSE  
 Red = Project increases WSE

- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



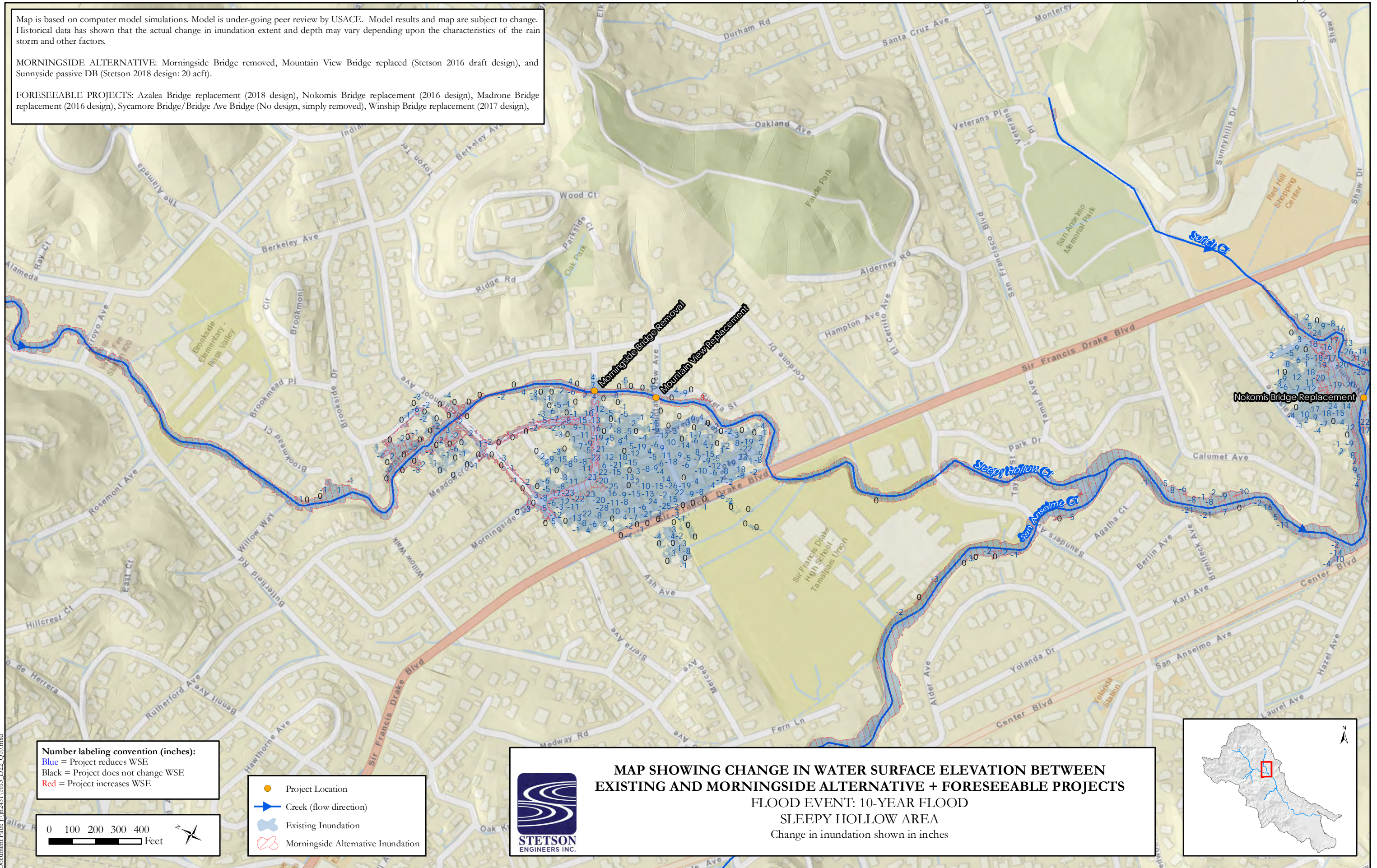
**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 10-YEAR FLOOD  
 FAIRFAX AREA  
 Change in inundation shown in inches



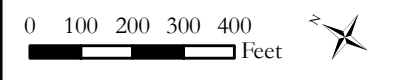
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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 10-YEAR FLOOD  
 SLEEPY HOLLOW AREA  
 Change in inundation shown in inches

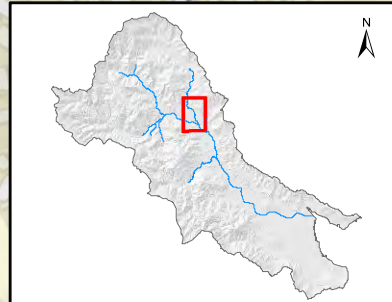
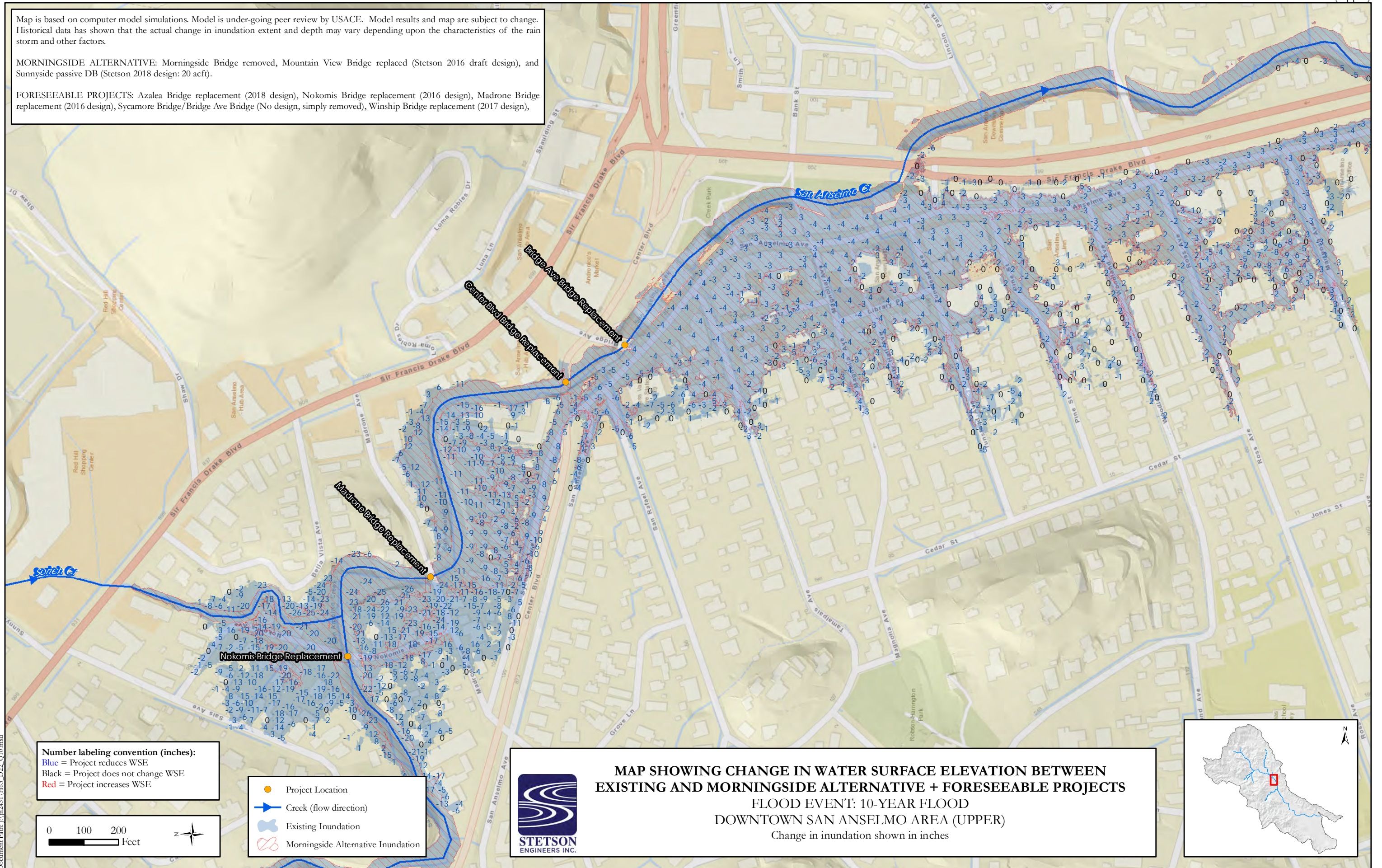


FIGURE 4c - Downtown San Anselmo Area (Upper)

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 Red = Project increases WSE

- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 10-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches

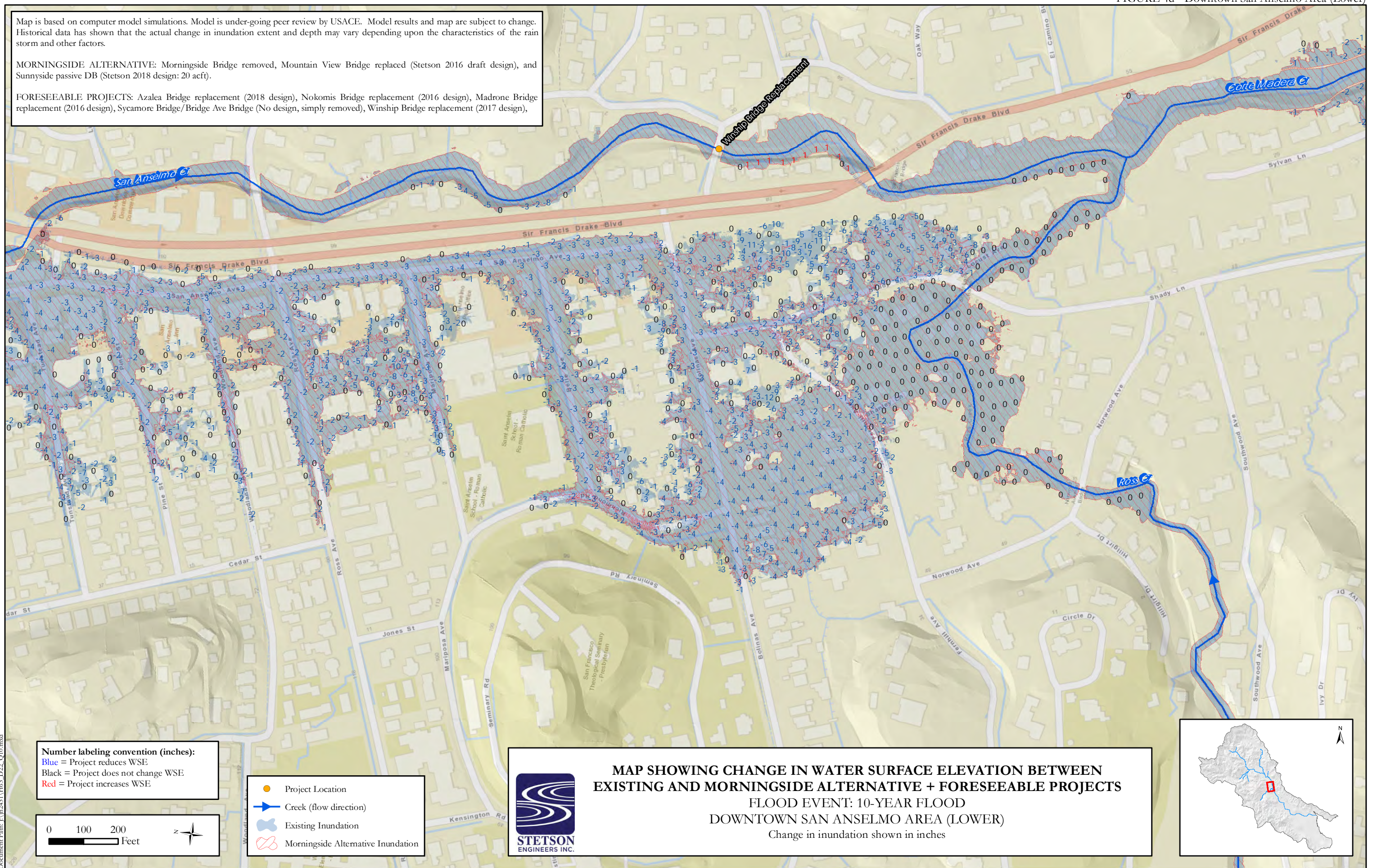


FIGURE 4d - Downtown San Anselmo Area (Lower)

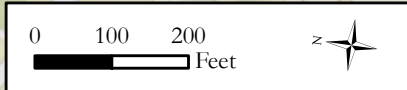
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**Number labeling convention (inches):**  
 Blue = Project reduces WSE  
 Black = Project does not change WSE  
 Red = Project increases WSE



- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



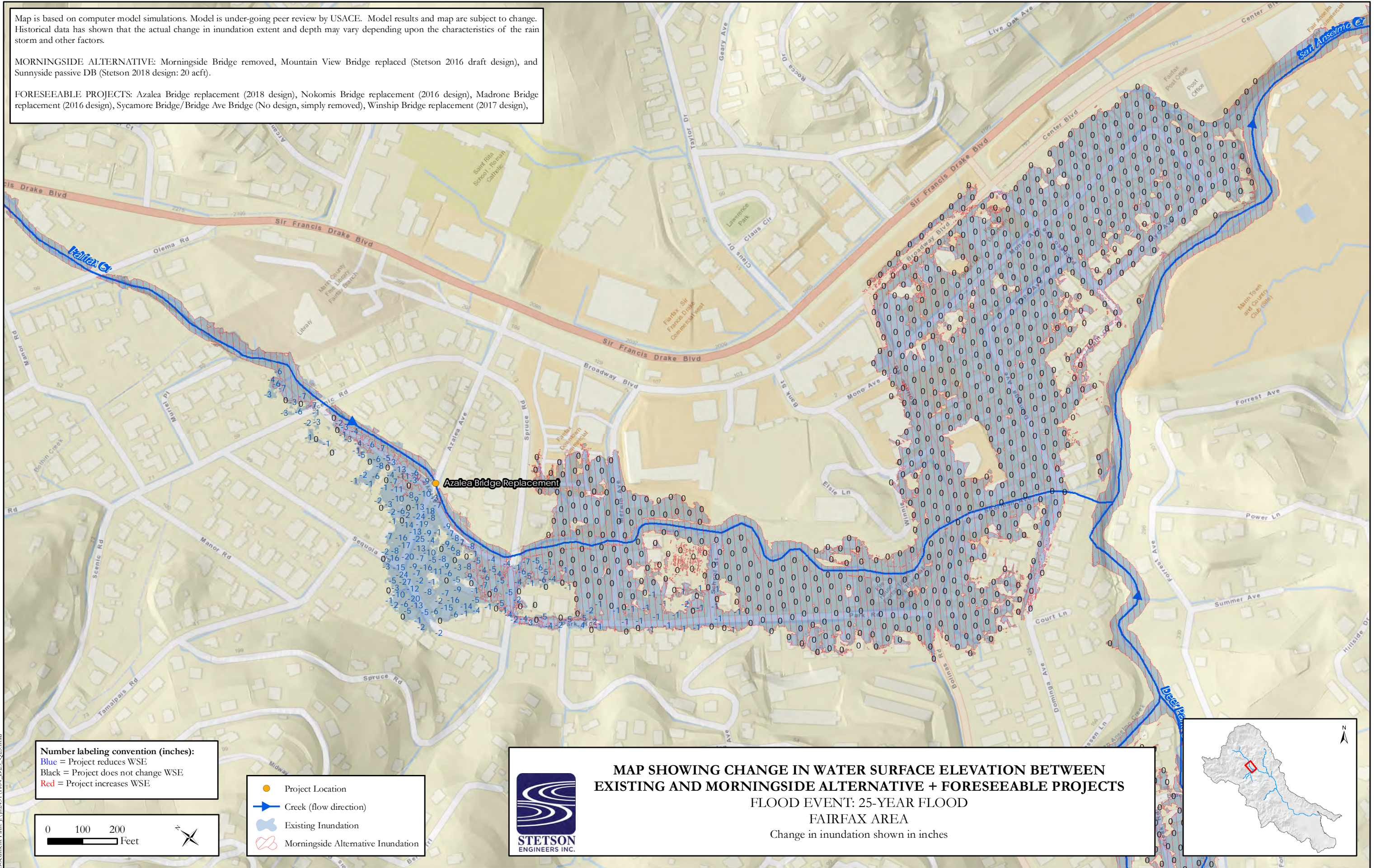
**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 10-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (LOWER)  
 Change in inundation shown in inches



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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation

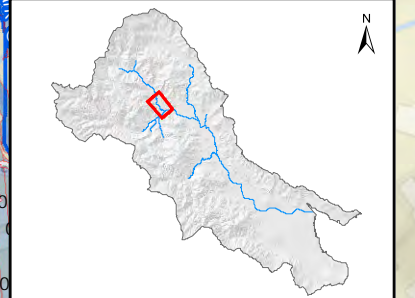


**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**

FLOOD EVENT: 25-YEAR FLOOD

FAIRFAX AREA

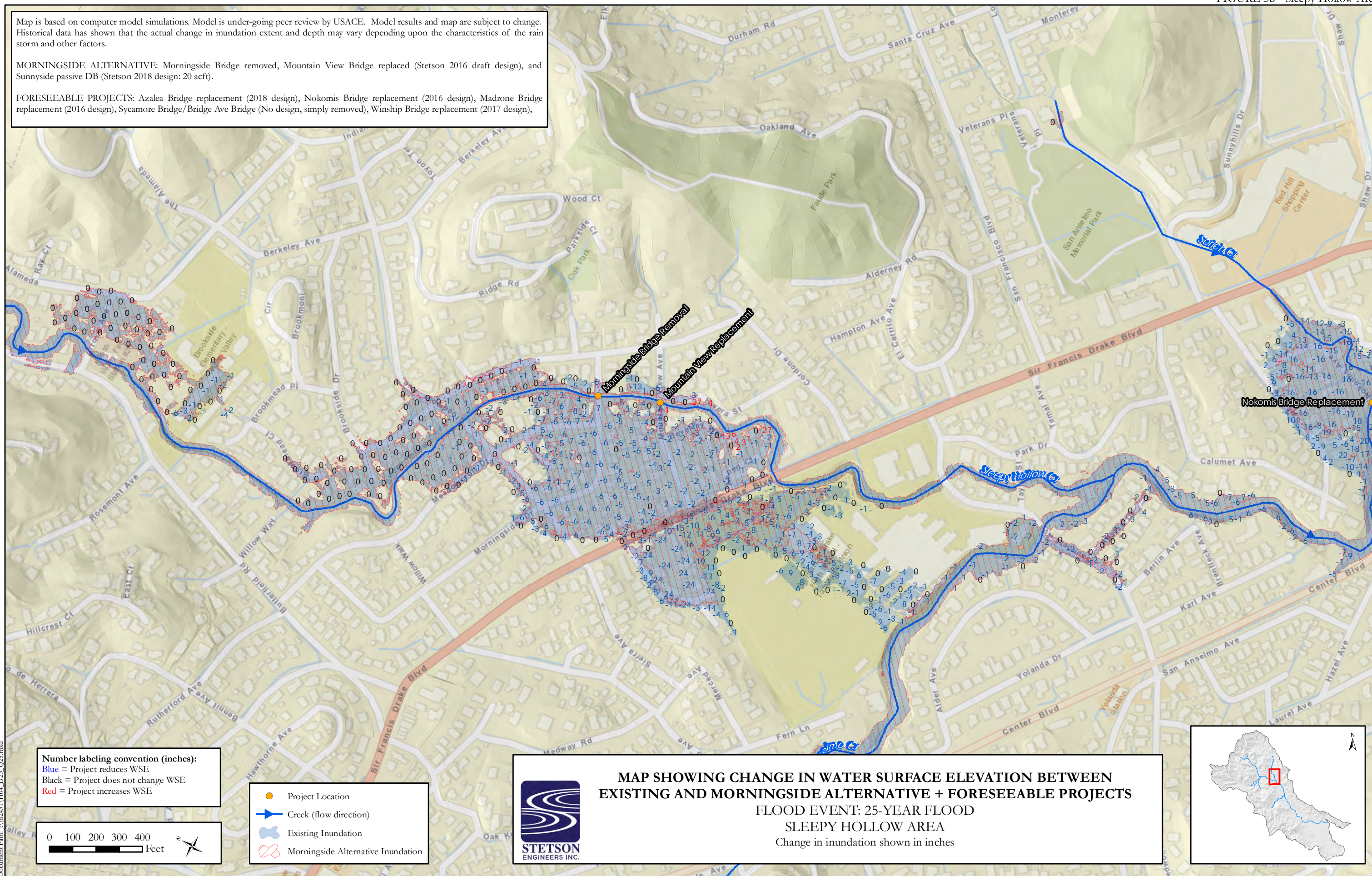
Change in inundation shown in inches



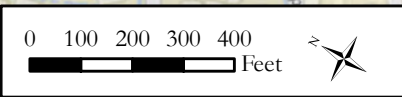
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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 25-YEAR FLOOD  
 SLEEPY HOLLOW AREA  
 Change in inundation shown in inches

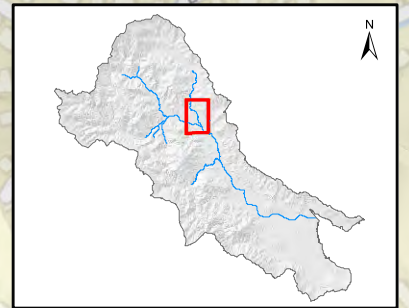
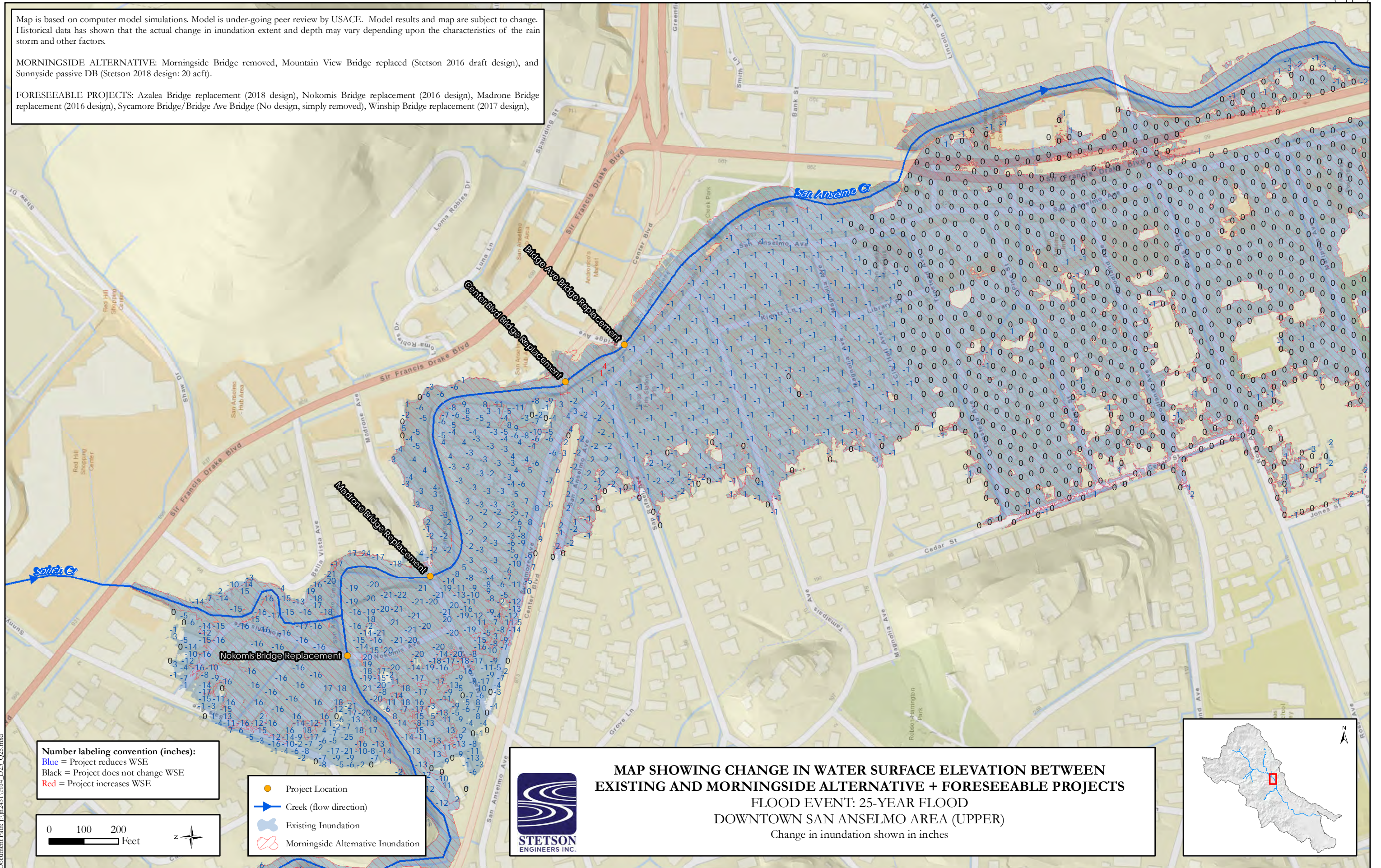


FIGURE 5c - Downtown San Anselmo Area (Upper)

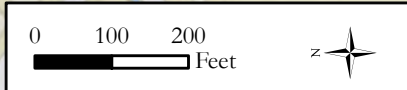
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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 25-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches



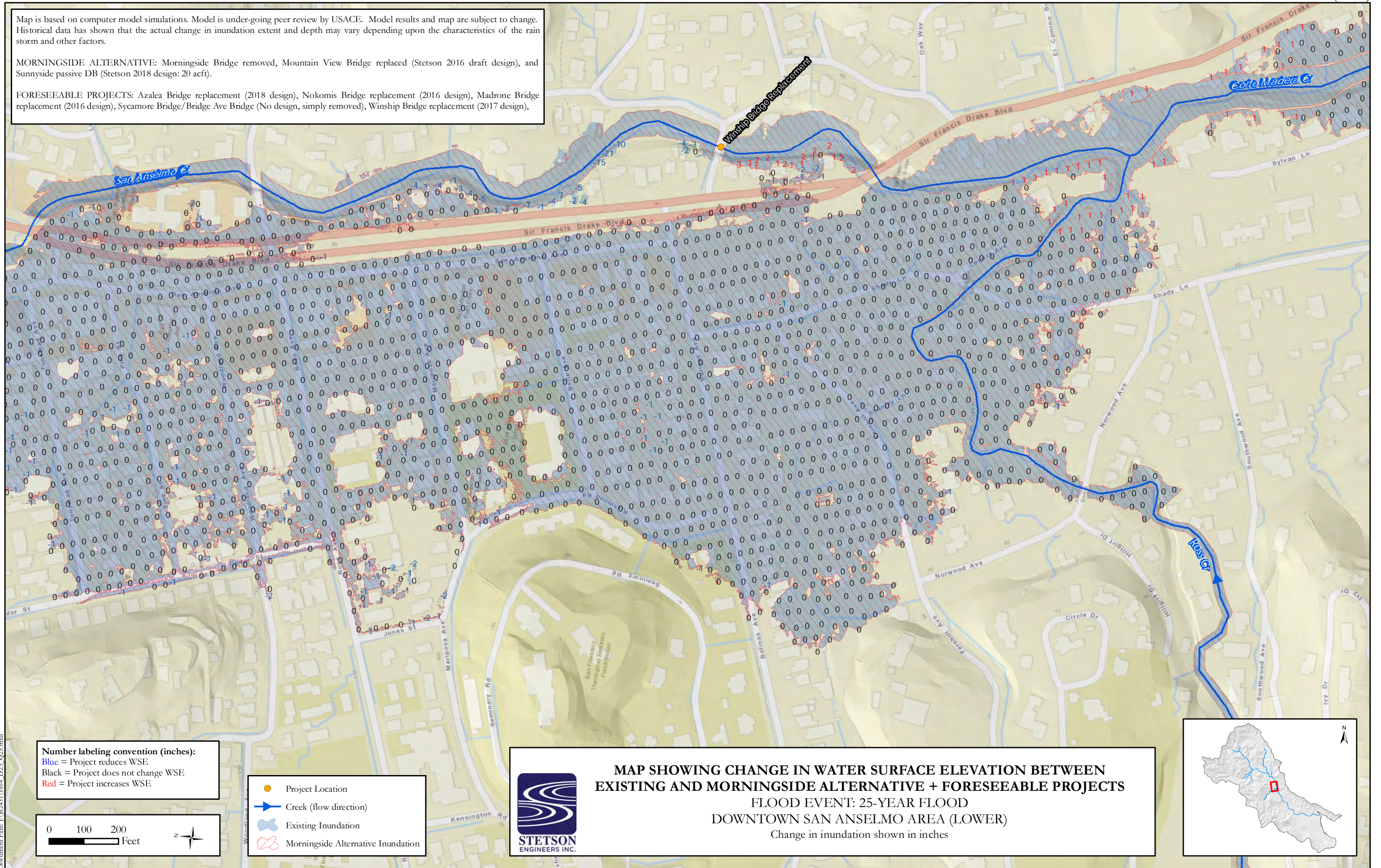


FIGURE 5d - Downtown San Anselmo Area (Lower)

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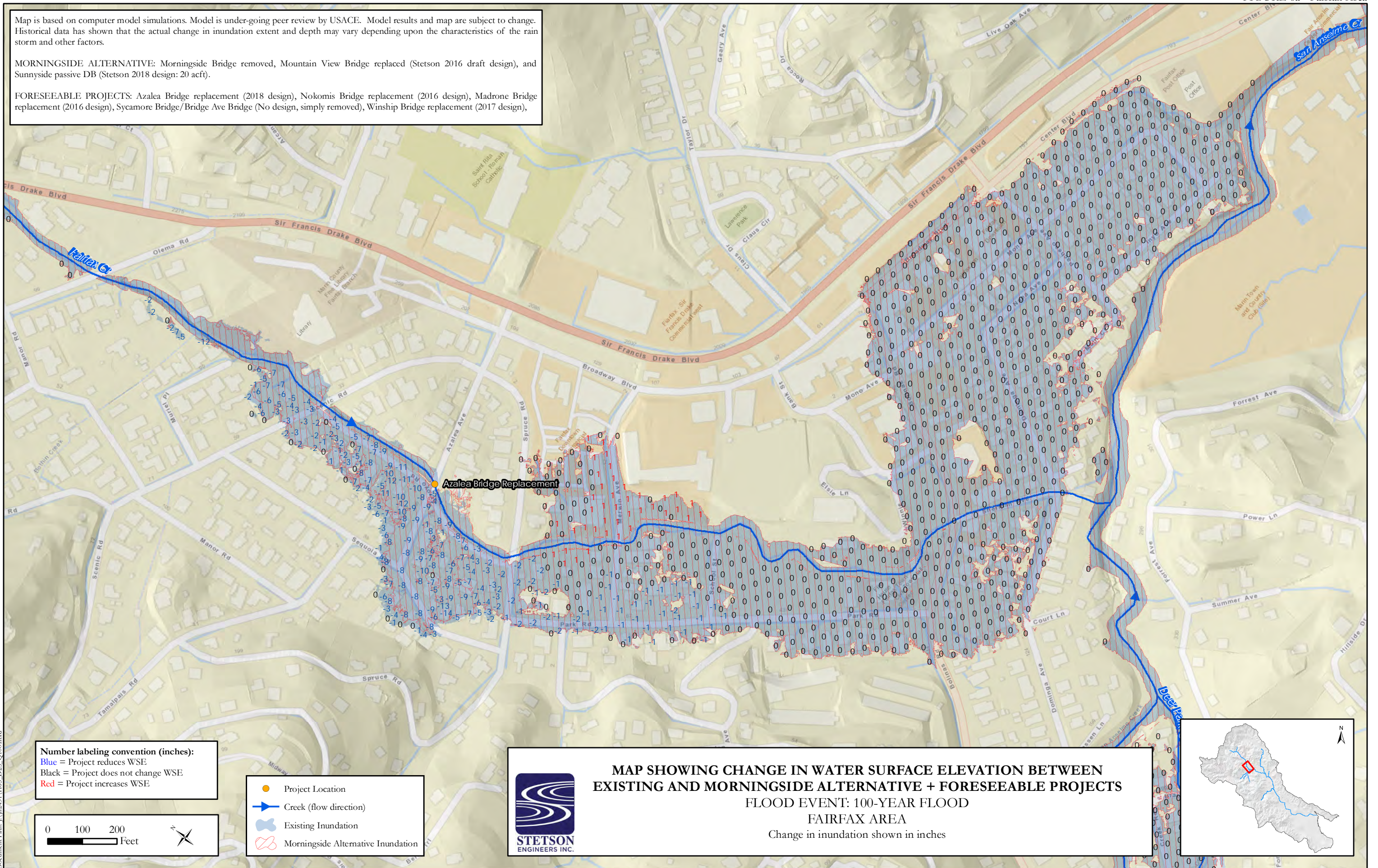
FORESEEABLE PROJECTS: Azalea Bridge replacement (2018 design), Nokomis Bridge replacement (2016 design), Madrone Bridge replacement (2016 design), Sycamore Bridge/Bridge Ave Bridge (No design, simply removed), Winship Bridge replacement (2017 design),



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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 100-YEAR FLOOD  
 FAIRFAX AREA  
 Change in inundation shown in inches



Map is based on computer model simulations. Model is under-going peer review by USACE. Model results and map are subject to change. Historical data has shown that the actual change in inundation extent and depth may vary depending upon the characteristics of the rain storm and other factors.

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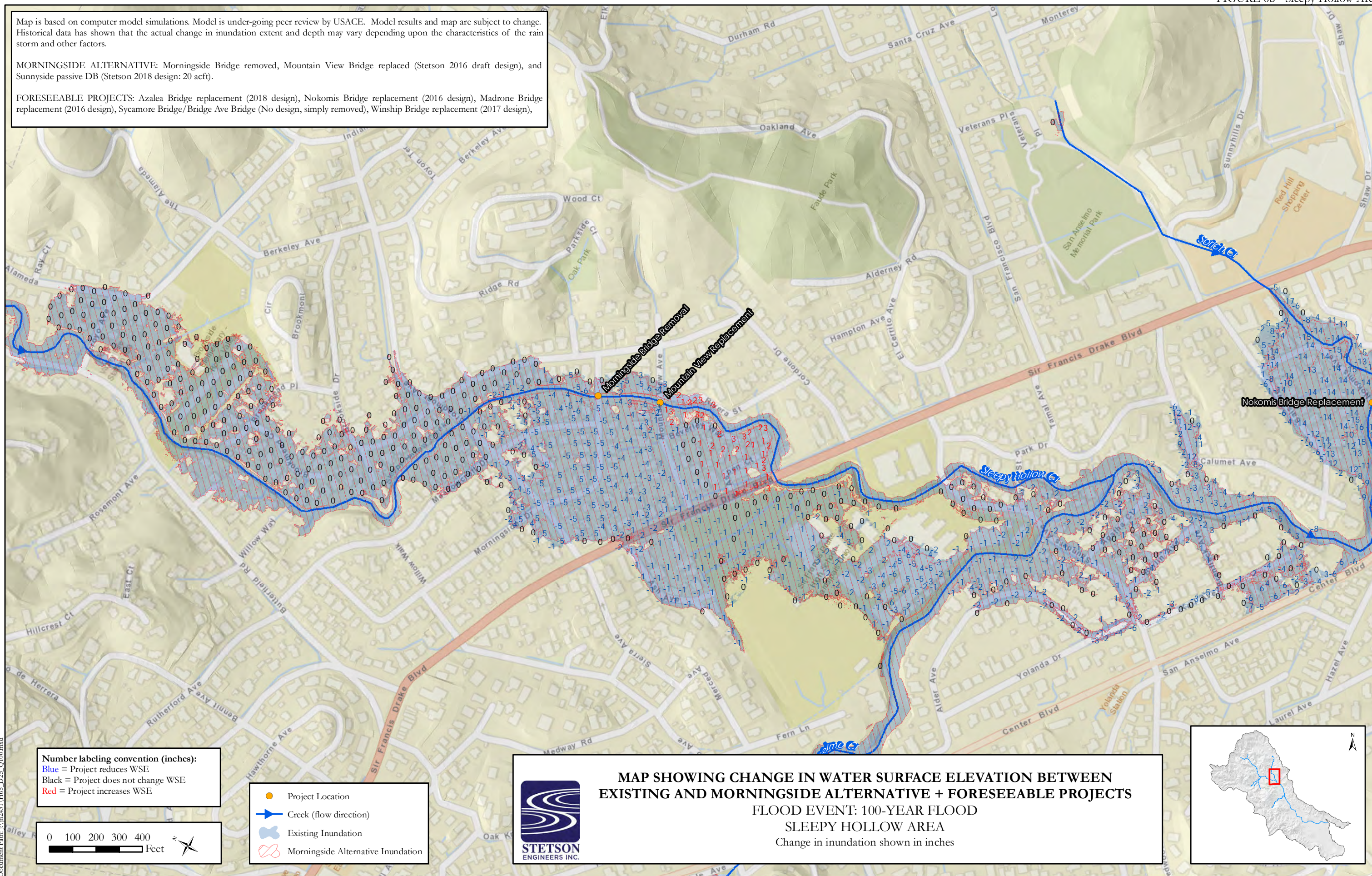
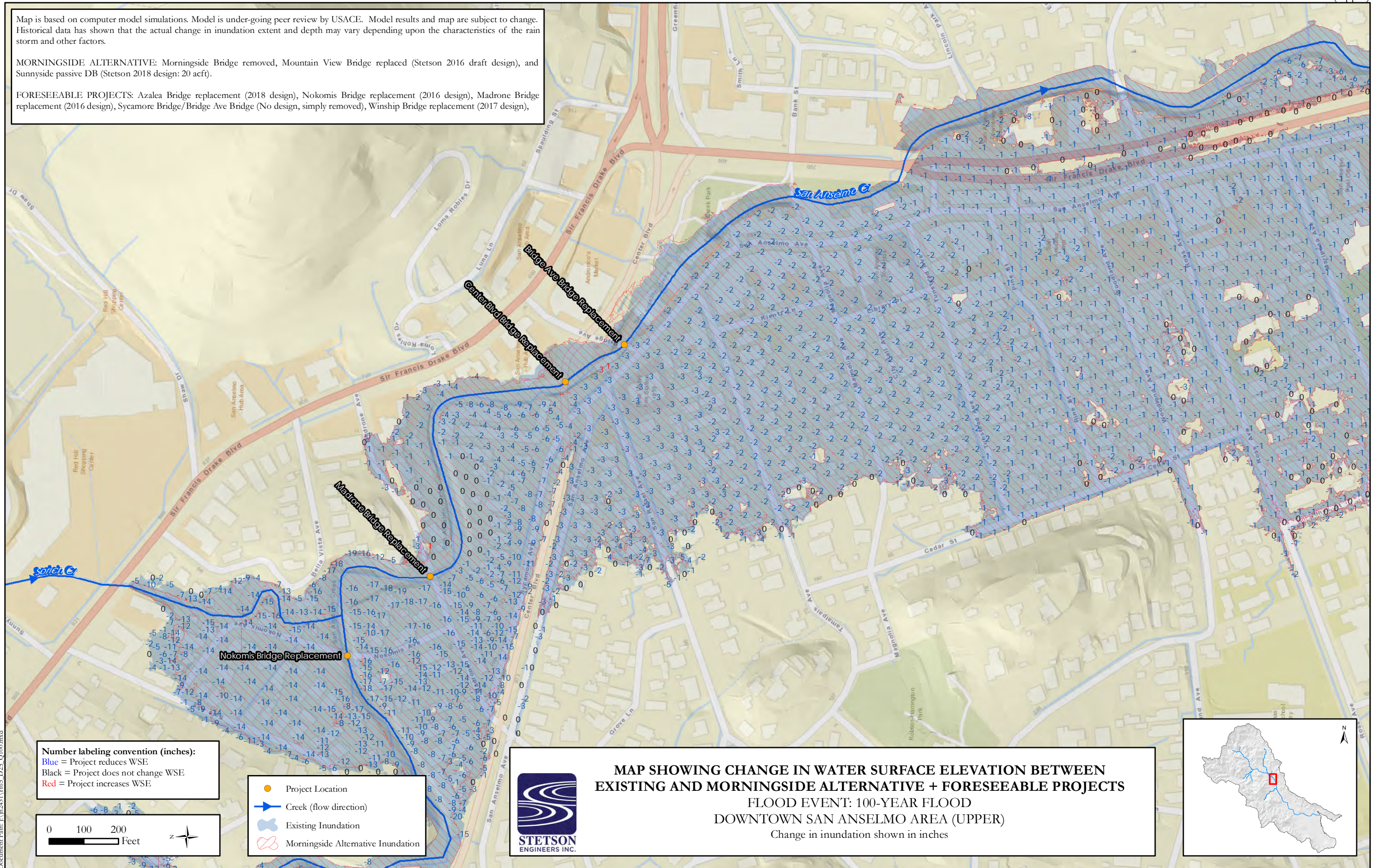


FIGURE 6c - Downtown San Anselmo Area (Upper)

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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 100-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (UPPER)  
 Change in inundation shown in inches

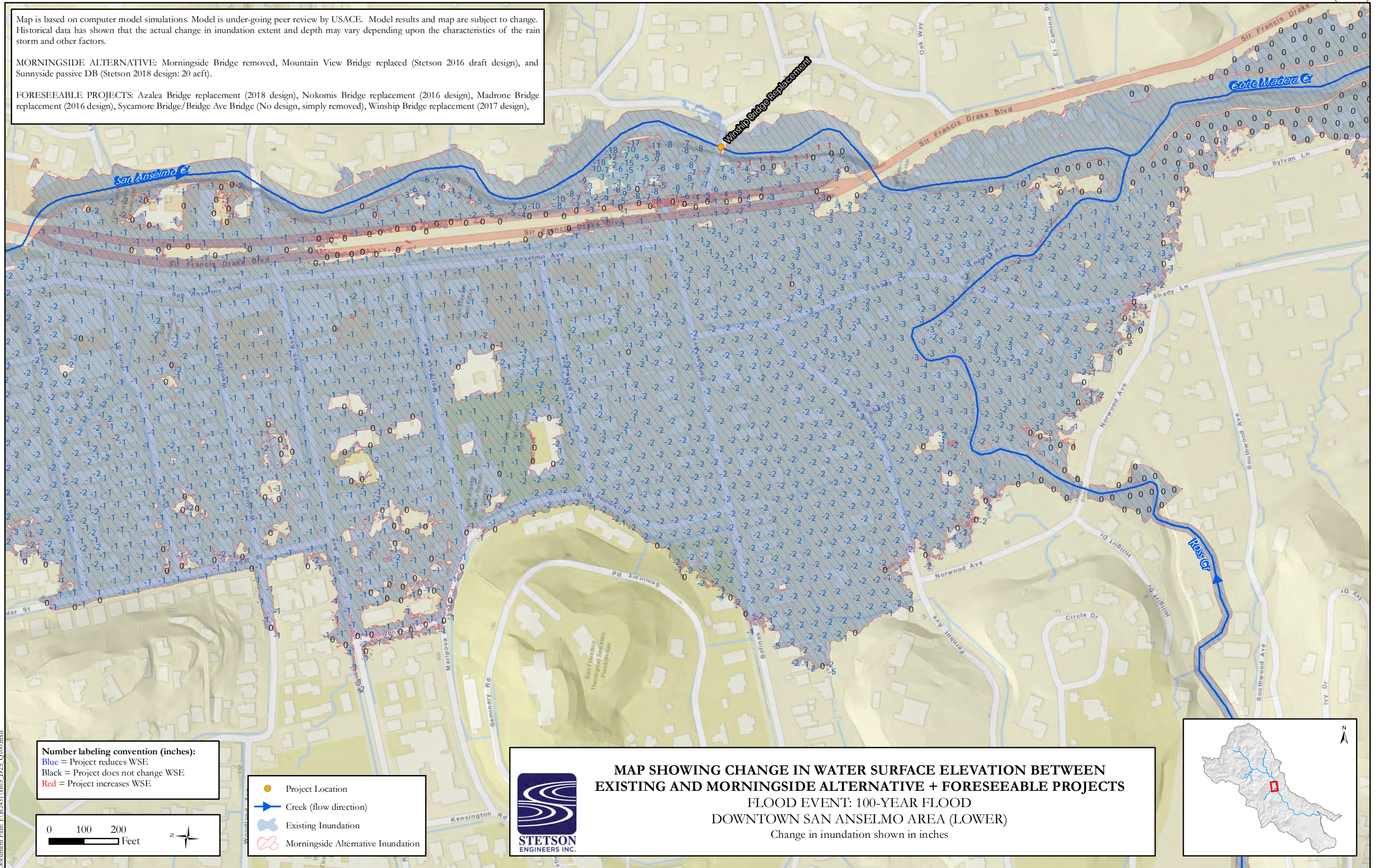


FIGURE 6d - Downtown San Anselmo Area (Lower)

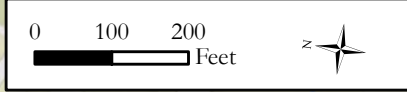
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- Project Location
- Creek (flow direction)
- Existing Inundation
- Morningside Alternative Inundation



**MAP SHOWING CHANGE IN WATER SURFACE ELEVATION BETWEEN  
 EXISTING AND MORNINGSIDE ALTERNATIVE + FORESEEABLE PROJECTS**  
 FLOOD EVENT: 100-YEAR FLOOD  
 DOWNTOWN SAN ANSELMO AREA (LOWER)  
 Change in inundation shown in inches

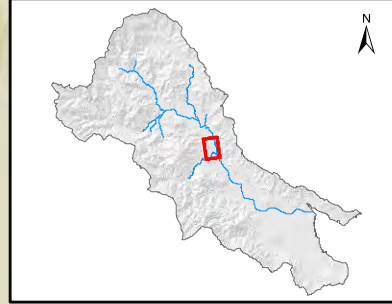


Figure 7a 10-Year Water Surface Profiles along Fairfax Creek

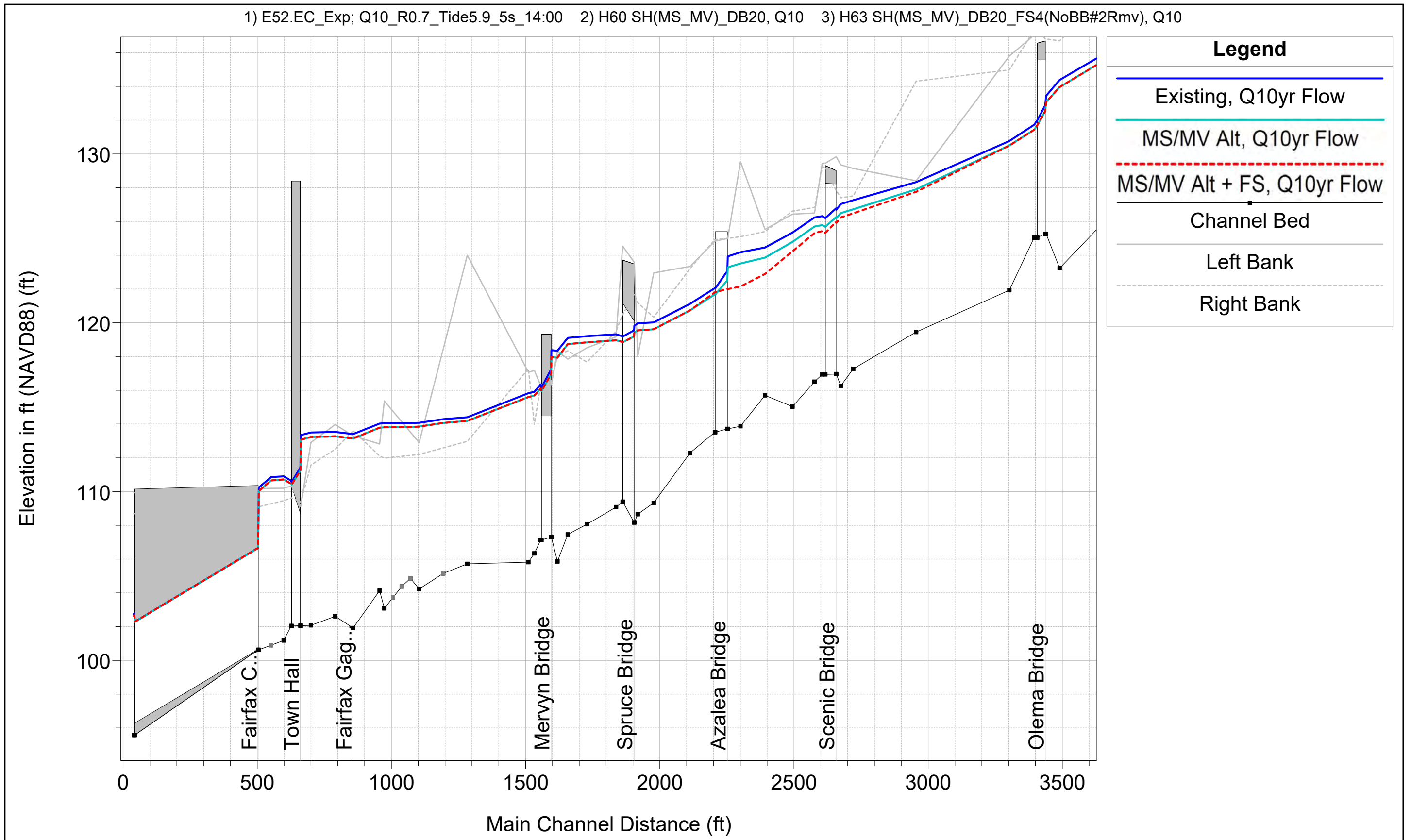


Figure 7b 25-Year Water Surface Profiles along Fairfax Creek

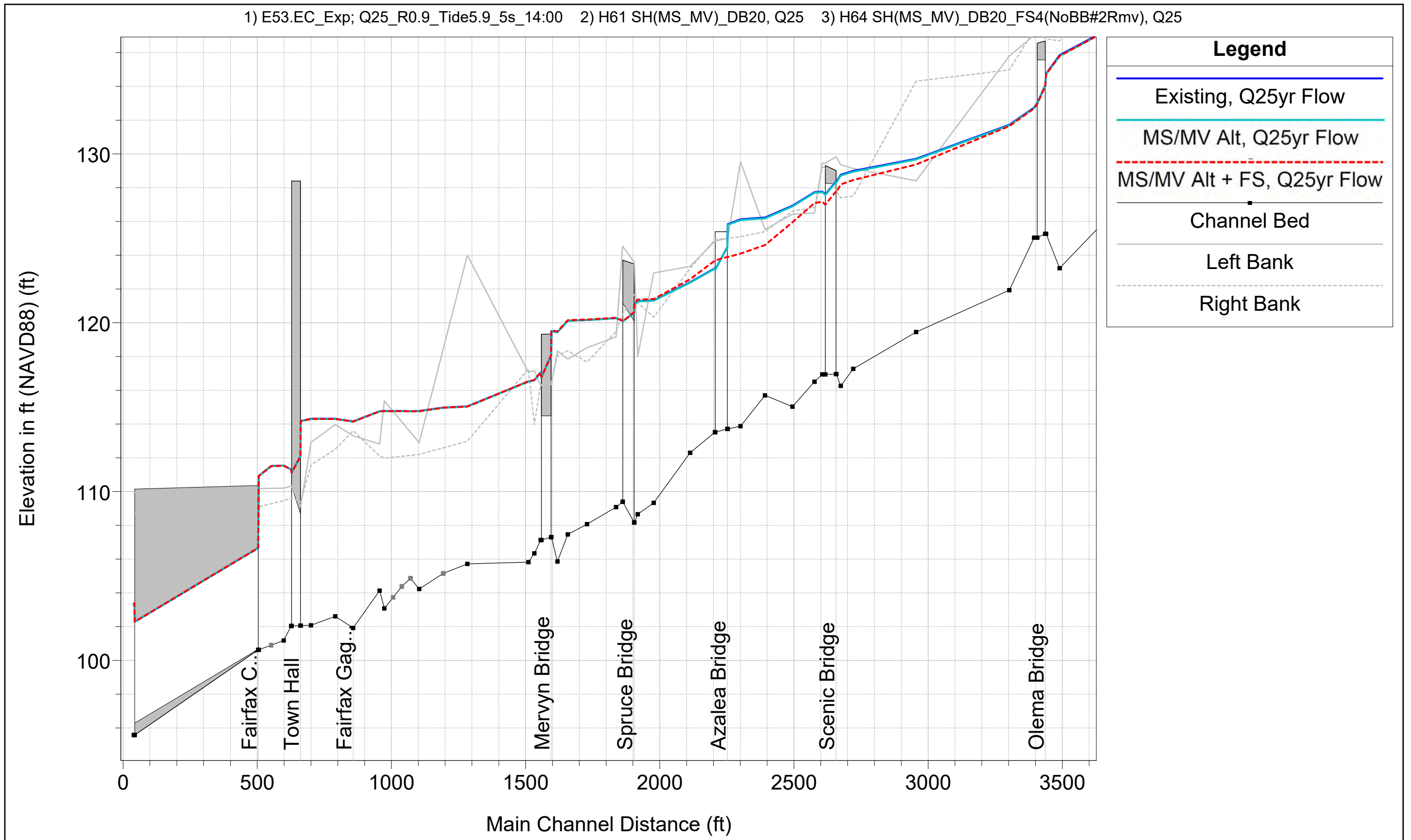


Figure 7c 100-Year Water Surface Profiles along Fairfax Creek

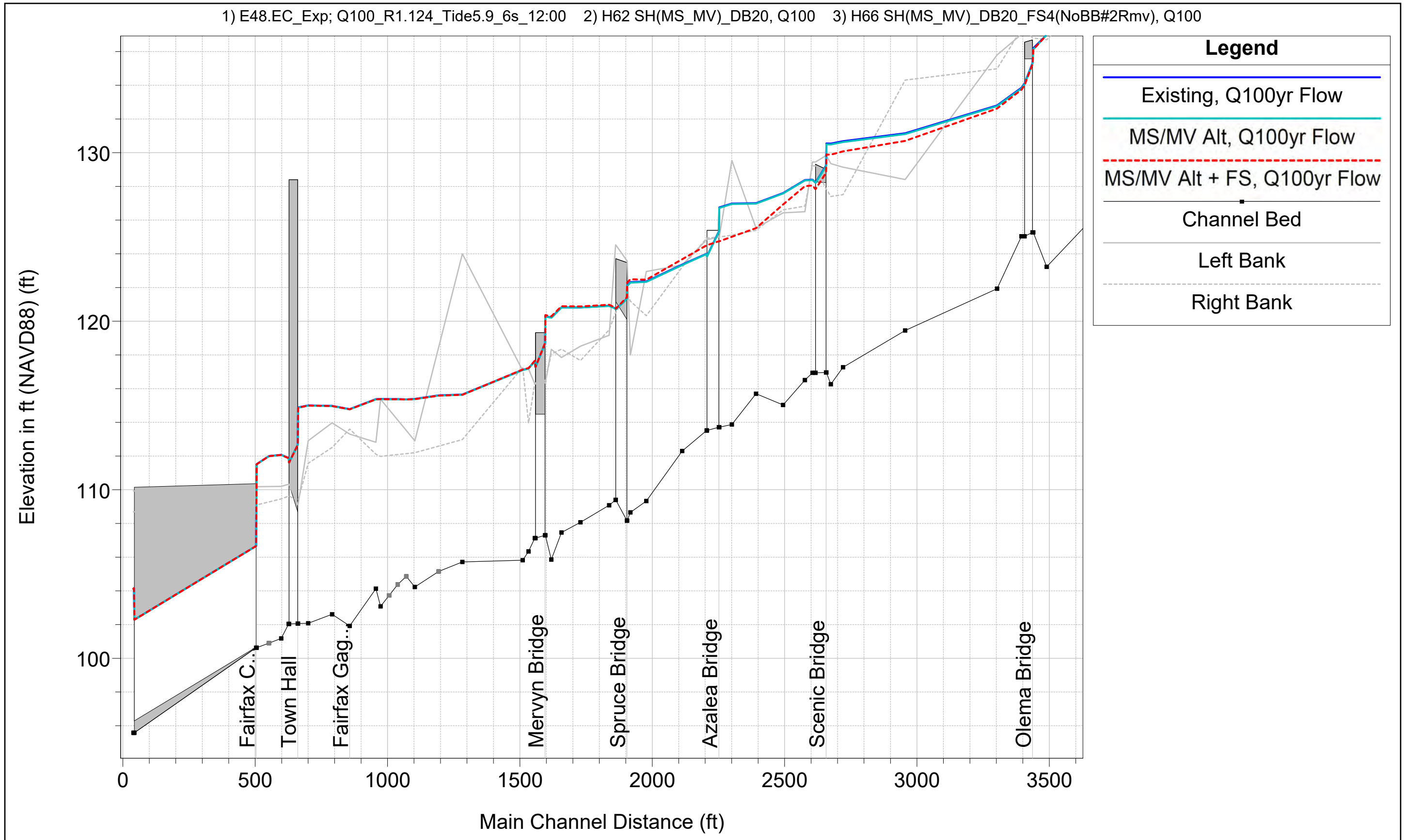




Figure 8a 10-Year Water Surface Profiles along Sleepy Hollow Creek

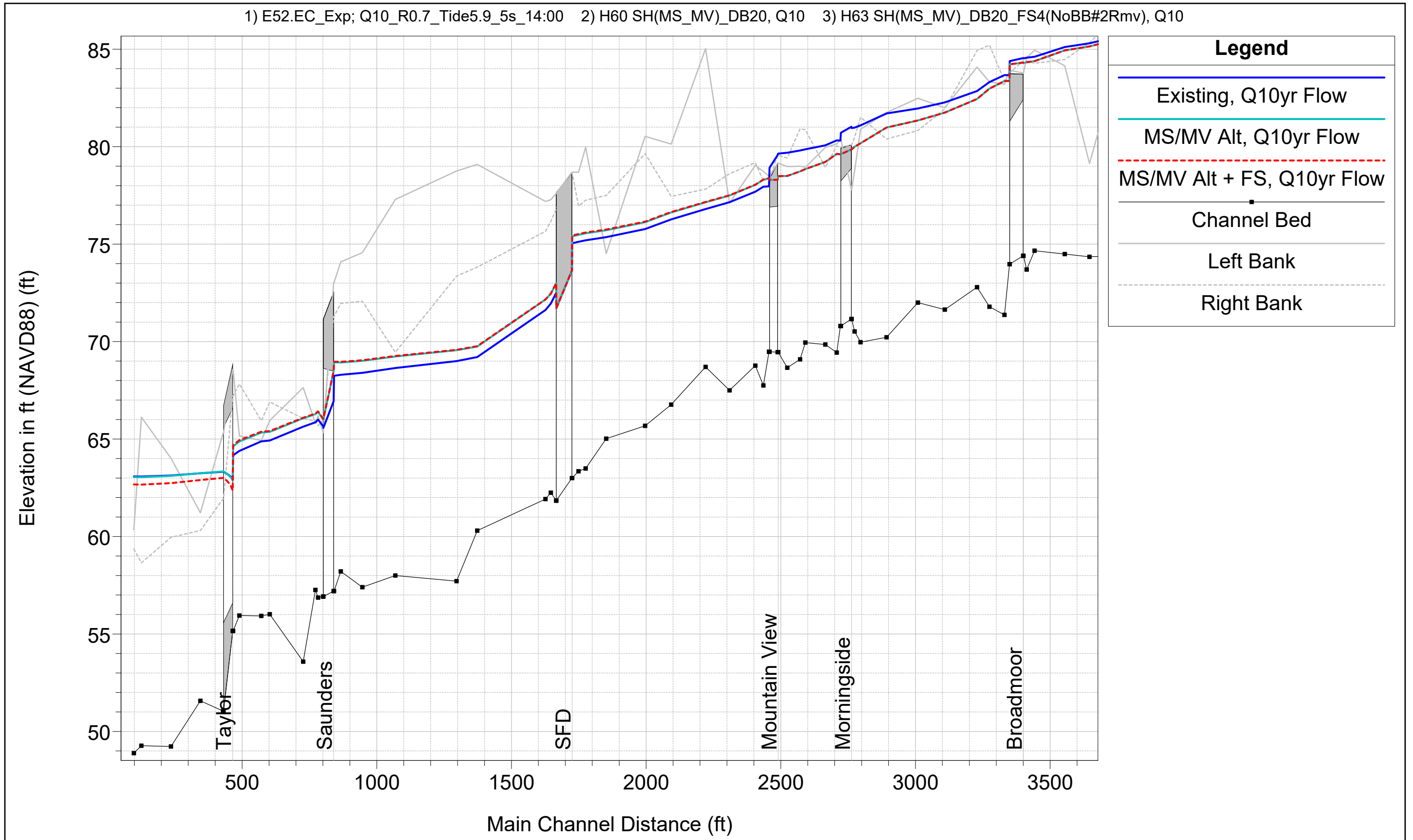


Figure 8b 25-Year Water Surface Profiles along Sleepy Hollow Creek

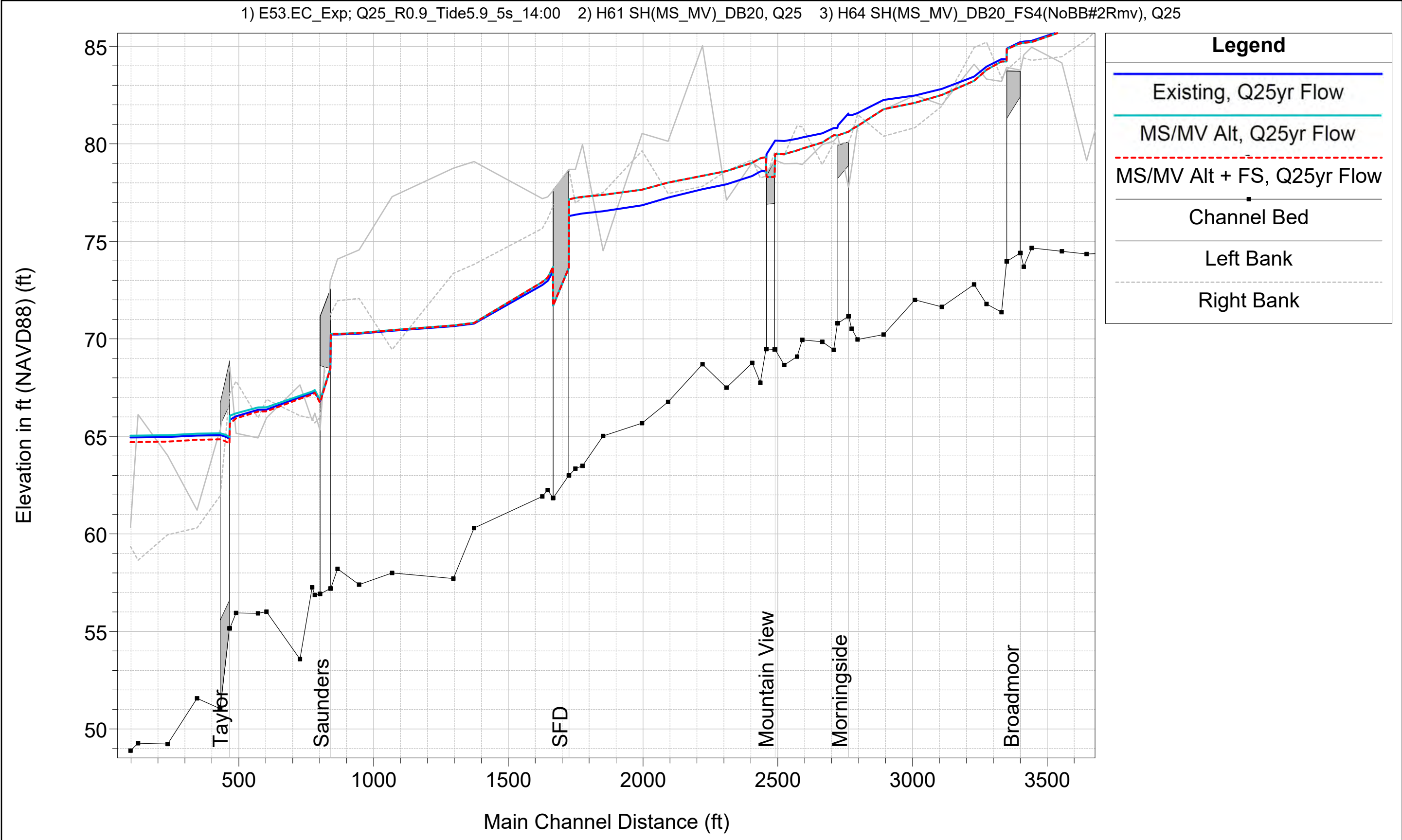


Figure 8c 100-Year Water Surface Profiles along Sleepy Hollow Creek

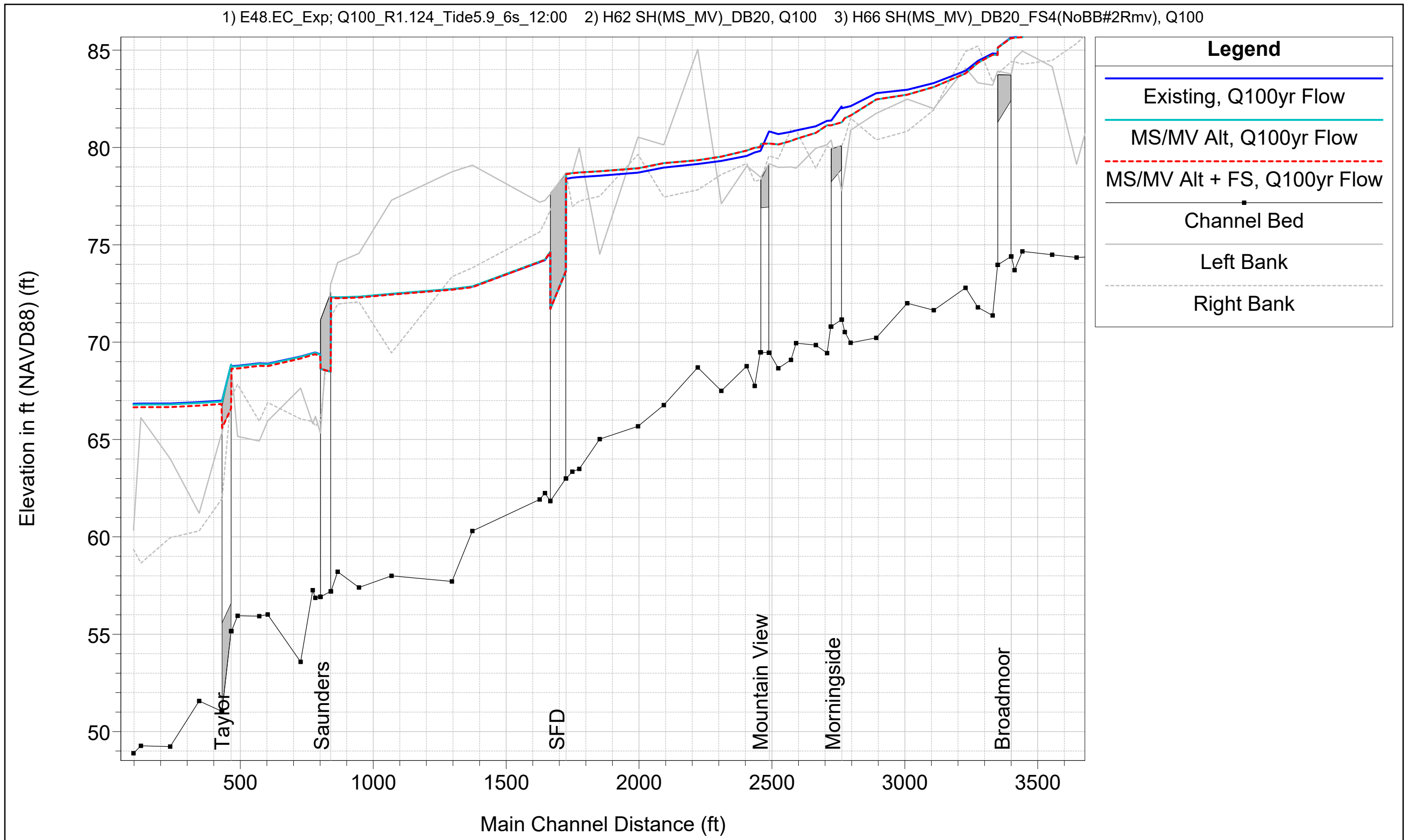
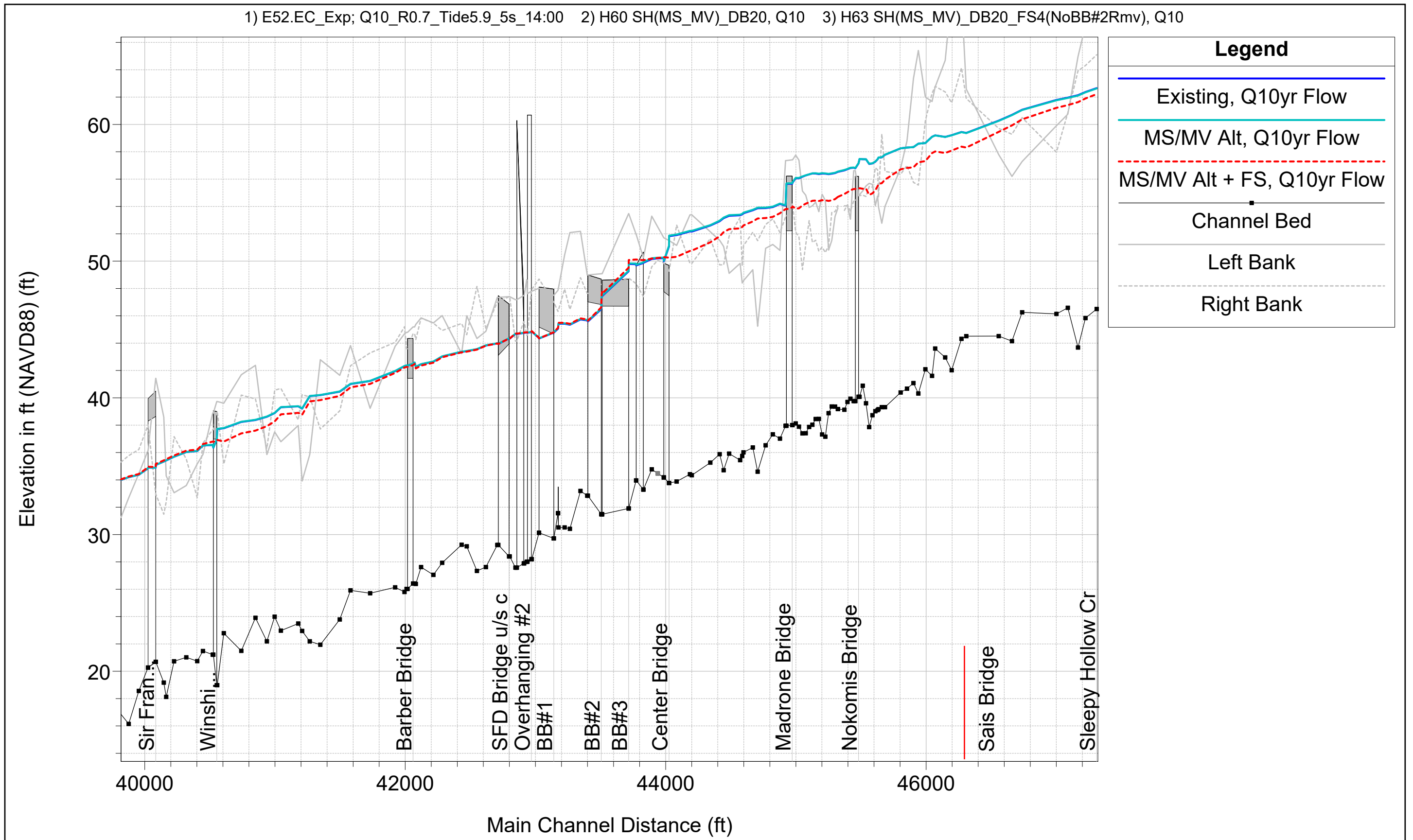
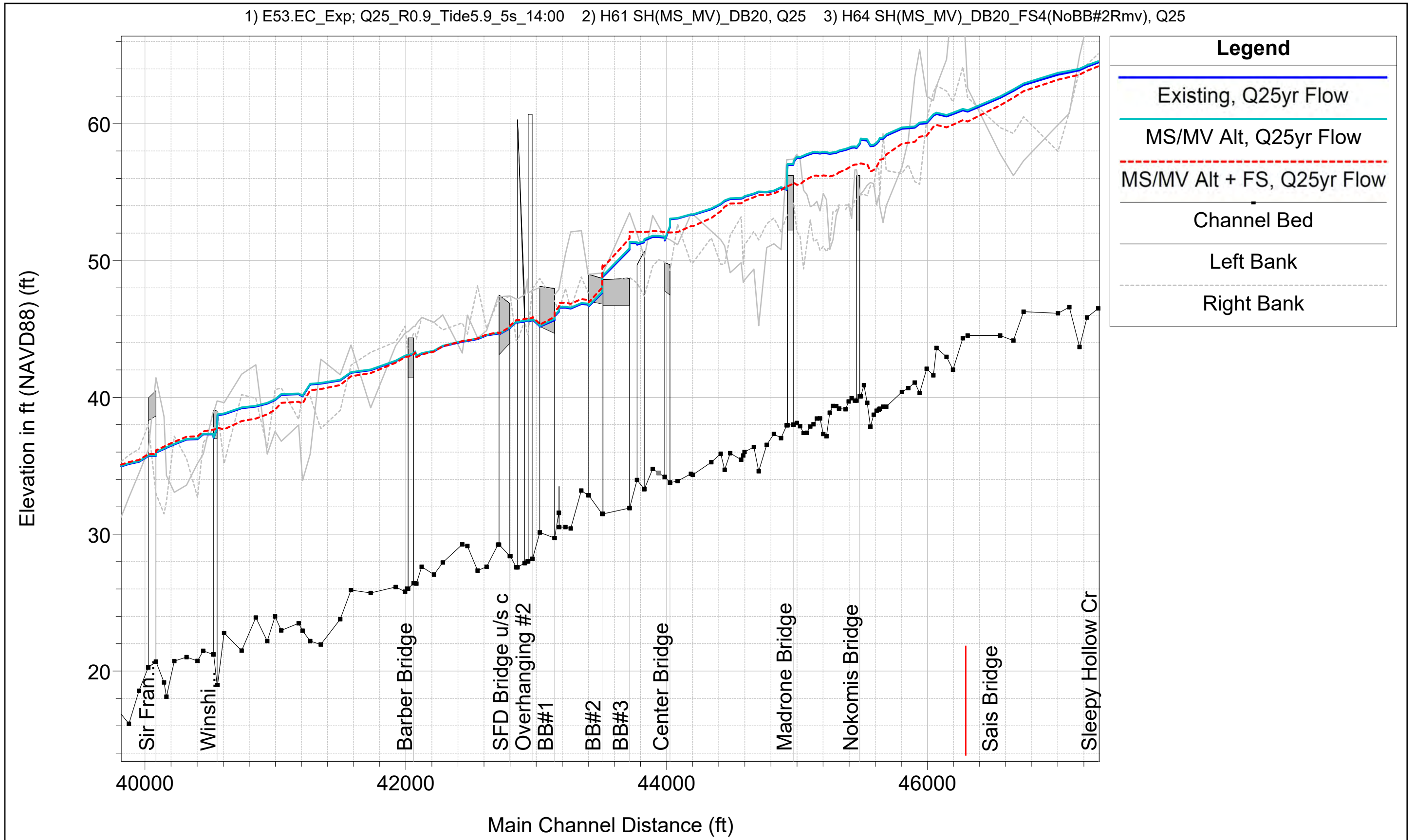


Figure 9a 10-Year Water Surface Profiles along San Anselmo Creek



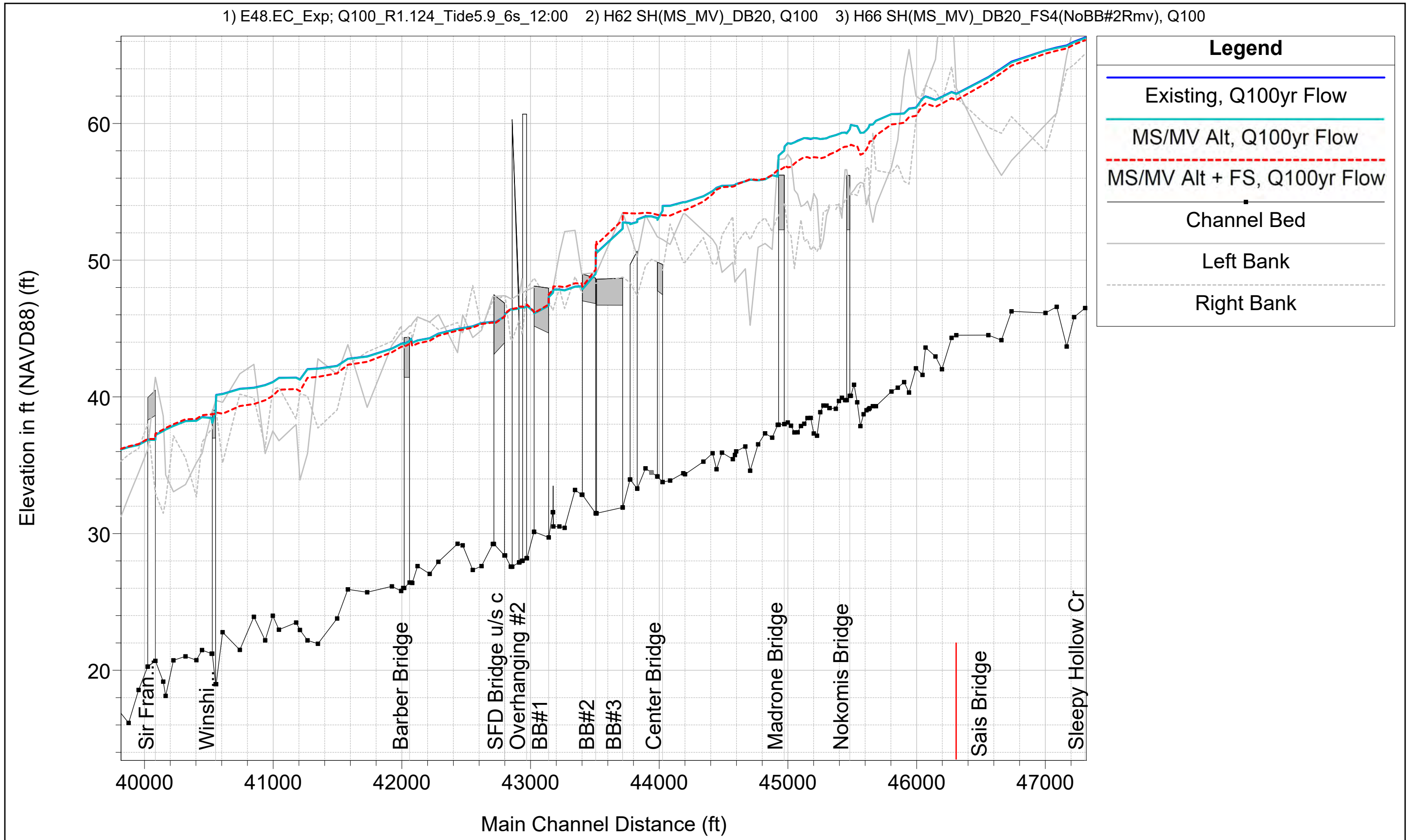
Note: The Sais Ave footbridge is not included in the model and not shown in the graph. This bridge is high and above the creek water surface elevation and, thus, has no backwater effect. The relatively high top of bank elevations at the Sais Ave footbridge shown in the graph is an indication of the high elevation of the bridge.

Figure 9b 25-Year Water Surface Profiles along San Anselmo Creek



Note: The Sais Ave footbridge is not included in the model and not shown in the graph. This bridge is high and above the creek water surface elevation and, thus, has no backwater effect. The relatively high top of bank elevations at the Sais Ave footbridge shown in the graph is an indication of the high elevation of the bridge.

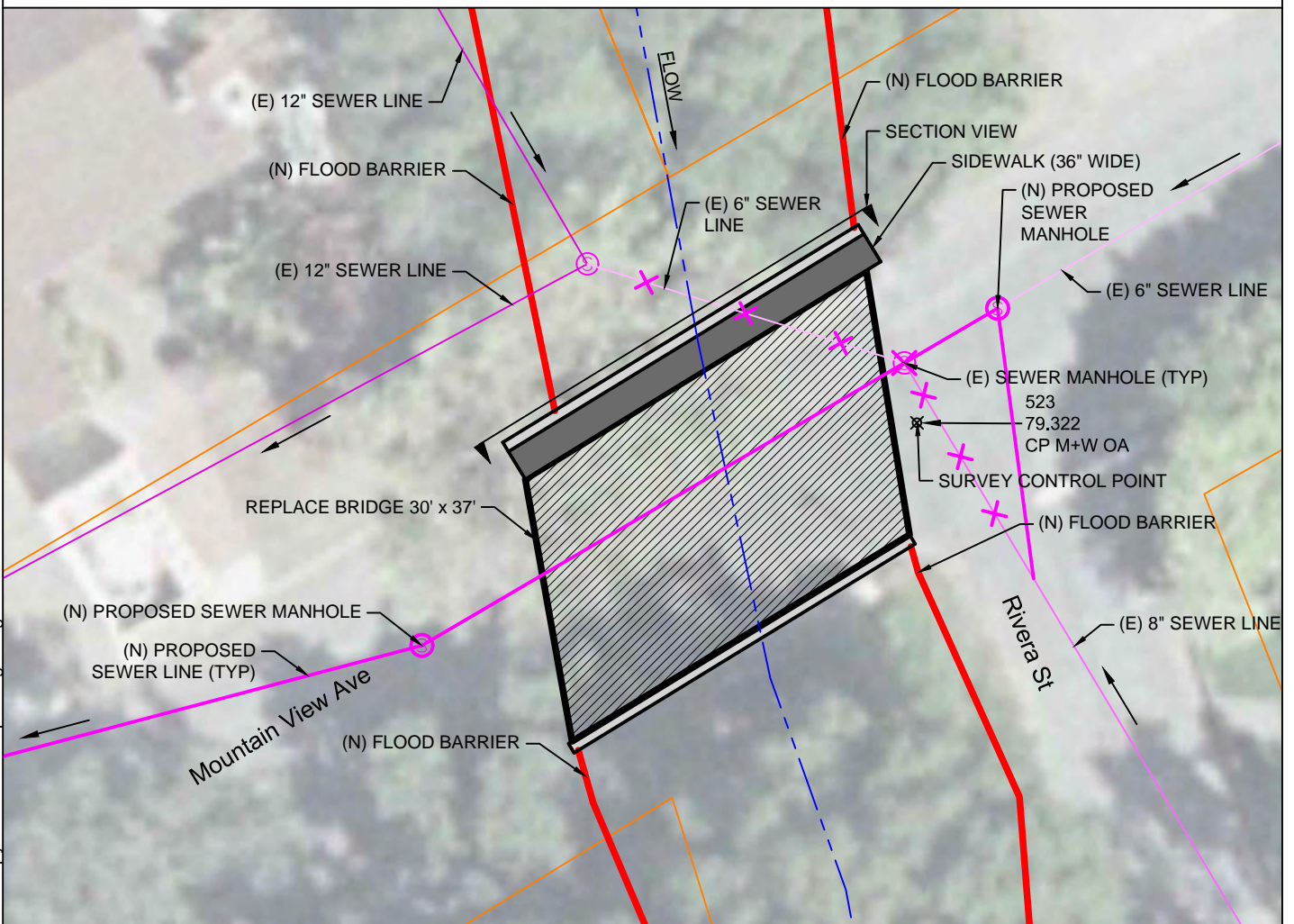
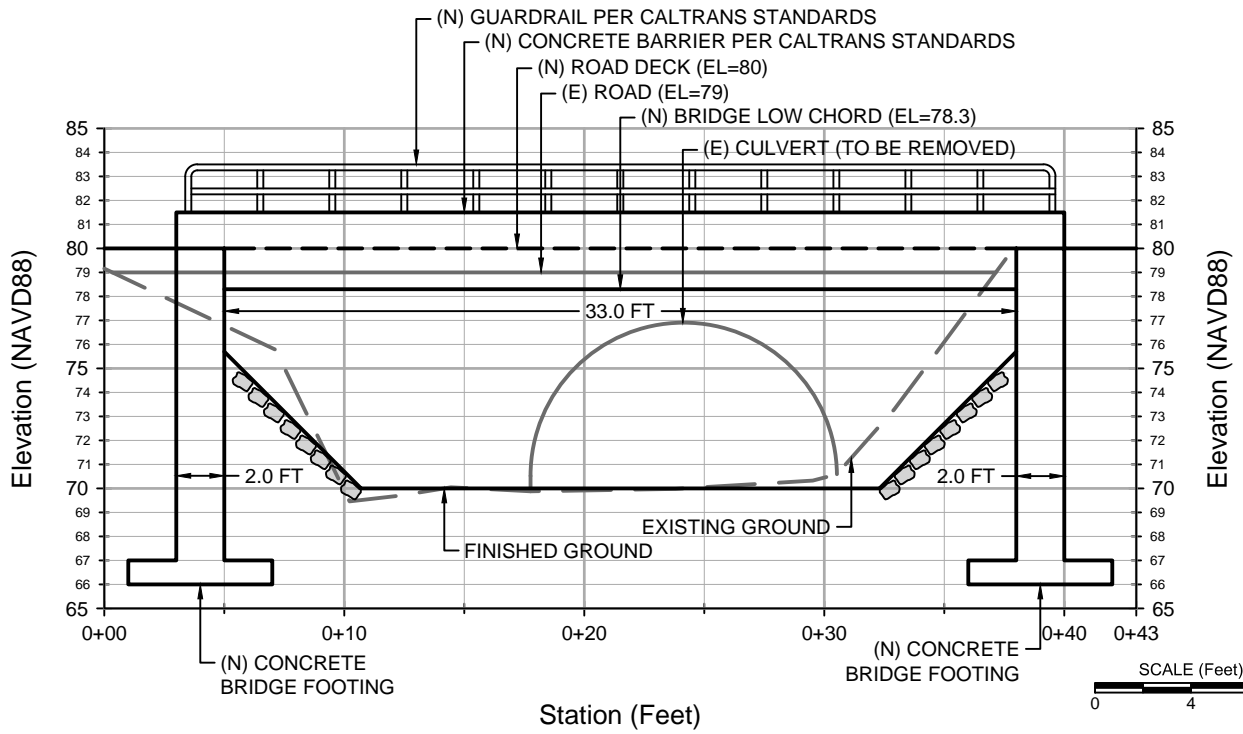
Figure 9c 100-Year Water Surface Profiles along San Anselmo Creek



Note: The Sais Ave footbridge is not included in the model and not shown in the graph. This bridge is high and above the creek water surface elevation and, thus, has no backwater effect. The relatively high top of bank elevations at the Sais Ave footbridge shown in the graph is an indication of the high elevation of the bridge.

**Attachment A**

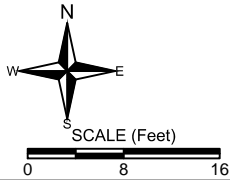
**Conceptual Designs and Mountain View Replacement Bridge and  
Sunnyside Passive Detention Basin**



F:\DATA\2431\AutoCAD\Sleepy Hollow\ConceptDesign.dwg

**LEGEND**

- ✕✕✕ REMOVE EXISTING SEWER
- INSTALL NEW SEWER

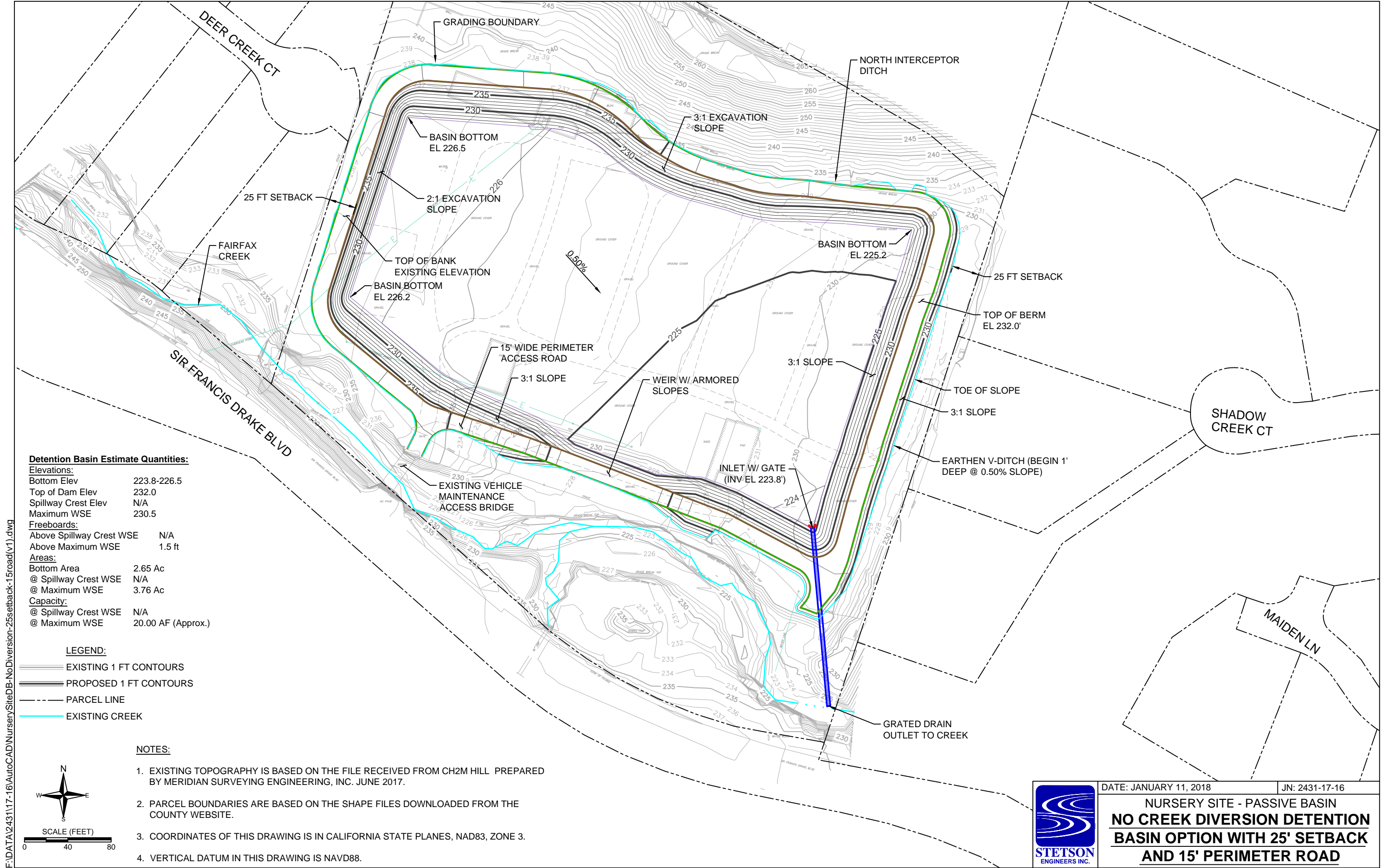


DATE: NOVEMBER 30, 2016

JN: 2431-16-1

# MOUNTAIN VIEW AVE BRIDGE REPLACEMENT





**Detention Basin Estimate Quantities:**

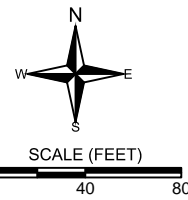
<b>Elevations:</b>	
Bottom Elev	223.8-226.5
Top of Dam Elev	232.0
Spillway Crest Elev	N/A
Maximum WSE	230.5
<b>Freeboards:</b>	
Above Spillway Crest WSE	N/A
Above Maximum WSE	1.5 ft
<b>Areas:</b>	
Bottom Area	2.65 Ac
@ Spillway Crest WSE	N/A
@ Maximum WSE	3.76 Ac
<b>Capacity:</b>	
@ Spillway Crest WSE	N/A
@ Maximum WSE	20.00 AF (Approx.)

**LEGEND:**

- EXISTING 1 FT CONTOURS
- PROPOSED 1 FT CONTOURS
- - - PARCEL LINE
- EXISTING CREEK

**NOTES:**

1. EXISTING TOPOGRAPHY IS BASED ON THE FILE RECEIVED FROM CH2M HILL PREPARED BY MERIDIAN SURVEYING ENGINEERING, INC. JUNE 2017.
2. PARCEL BOUNDARIES ARE BASED ON THE SHAPE FILES DOWNLOADED FROM THE COUNTY WEBSITE.
3. COORDINATES OF THIS DRAWING IS IN CALIFORNIA STATE PLANES, NAD83, ZONE 3.
4. VERTICAL DATUM IN THIS DRAWING IS NAVD88.



DATE: JANUARY 11, 2018 JN: 2431-17-16

**NURSERY SITE - PASSIVE BASIN**  
**NO CREEK DIVERSION DETENTION**  
**BASIN OPTION WITH 25' SETBACK**  
**AND 15' PERIMETER ROAD**

F:\DATA\2431\17-16\AutoCAD\NurserySiteB-NoDiversion-25setback-15road(v1).dwg