JAMESTOWN
Incorporated April 4, 1883 COLORADO

Lower Main St. Crossing of James Creek

RockSol
Consulting Group, Inc.

esign Team

RockSol Consulting Group, Inc.

Project Principal – Miranda Lange, P.E.
Project Manager – Dan Tuttle, P.E.
Structural Engineer – Steven Lykens, P.E.
Geotechnical Engineer – Ryan Lepro, P.G.
Roadway Design – Dan Tuttle, P.E.

AYRES SSOCIATES

d Hydraulics – Anthony Alvarado, P.E.
raulics Engineer– James Hitchman, P.E.

Antares PLANNING GROUP, LLC

BCA Analysis – Steve Pardue

roject Background

After the 2013 floods, the Town applied for and received a FEMA Hazard Mitigation Program Grant (HMGP) to analyze the Lower Main St. crossing of James Creek.

After the proposal and interview process, our team was awarded this project in late May 2016.

The main objective of this project, is to: ***Increase the capacity of the creek crossing to pass the 100-year storm event to reduce the risk of similar damage in a future flood.***

The major scope items that our team has been tasked with includes (but is not limited to):

- Topographic Survey
- Hydrology/hydraulic analysis for existing and proposed conditions
- Geotechnical investigations and reporting
- Develop alternatives for proposed improvements
- Benefit Cost Analysis (BCA)
- 60% design plans, specifications, and estimate

rogression of Project

2016

May

- Awarded Project
- Finalizing Contract & ubcontracts

June

- Data Collection (LOMR data, utilities,
- Hydrology & Hydraulic Analysis of Existing Conditions

July

- Hydraulic Analysis for existing conditions continued
- Field Survey Done & Received Topographic Survey

August

- Hydraulics for existing conditions complete; begin analyzing proposed conditions.
- Geotechnical Bores Done (Bedrock ~23' Deep)
- Begin preliminary design for 3 alternatives

September

- Public Involvement & Town Board Presentation
- BCA Analysis

October

- Direction from Town Board for selected design alternative
- Begin 60% design upon receiving Town Board Approval

roject Information

finition(s):

Freeboard - This is the distance between the water surface elevation and the bottom of the bridge. Freeboard is important because it correlates with the ability to pass floating debris. If we can pass floating debris, there is a high likelihood that the bridge does not get plugged and then flanked.

Clear Flow - This represents the flow of water that passes under the bridge with NO debris.

Debris Flow - This represents the flow of water that passes under the bridge with debris.

draulics & Hydrology:

Hydraulic Modeling - It is difficult to model debris flow, but as a standard practice, 2 or more feet of freeboard is used as a target during design.

nitial Alternatives

de the cut

- **Option 1 - Remove and Replace Bridge**
- **Option 2 - Raise Existing Bridge Deck**
- **Option 3 - Additional Span**

scarded

- **Remove and Relocate Bridge Downstream -** VCUP issues at Elysian Park and private property impacts
- **Fuse Plug -** Difficult to design for the unknown & didn't solve problem.
- **Widen and Raise Existing Bridge** - High cost and difficult to design with no as-built plans.
- **nothing**
- **Existing Bridge**

xisting Bridge

OS

- No construction needed.
- No construction impact to private property.

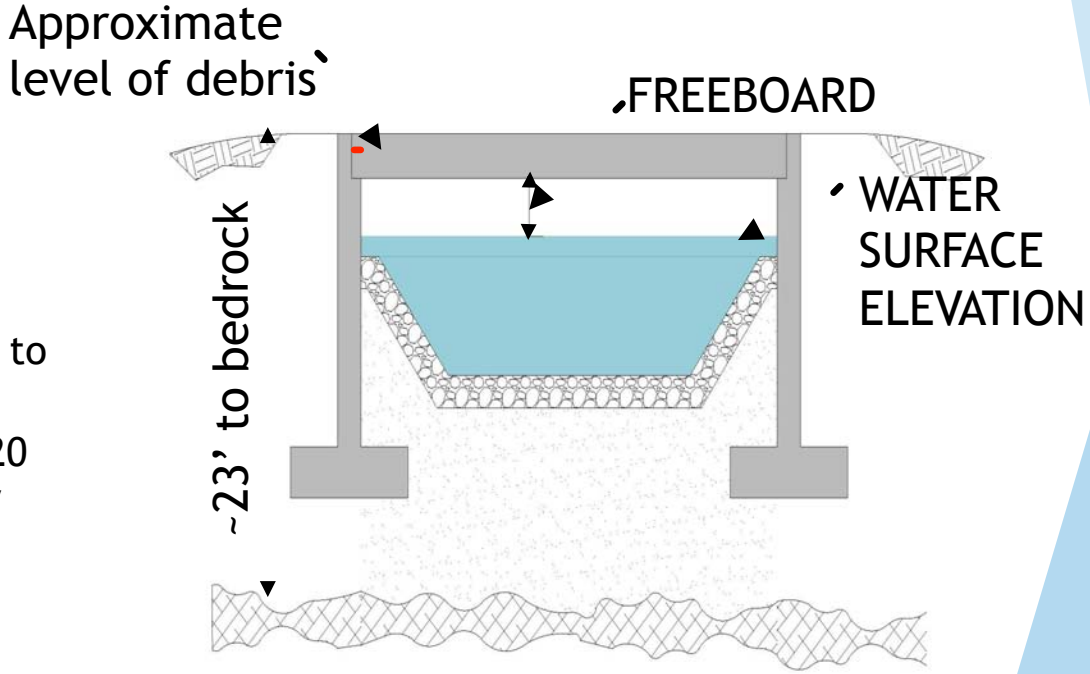
NS

- Does not pass 100-year flow.
- Shallow spread footings that are vulnerable to failure during a 50 & 100-year storm.
- Old bridge built in 80s with approximately 20 years left on its lifespan (assuming properly maintained).

imated Cost:

ure maintenance costs needed includes: deck ab, spalling, future storm damage,etc.

FREEBOARD DURING 100-YEAR EVENT



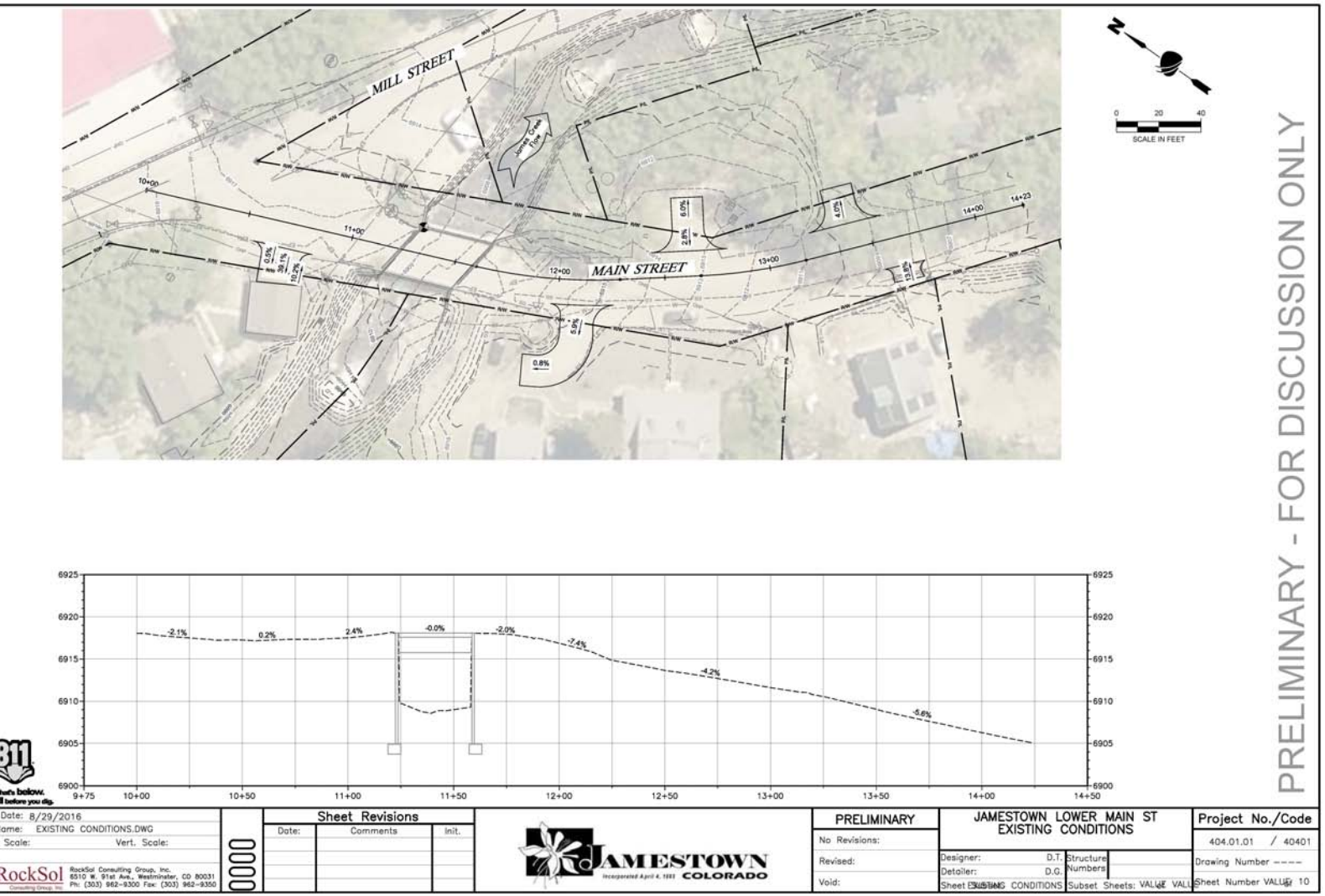
Freeboard Per Storm Event:

100-Year = 0 FT

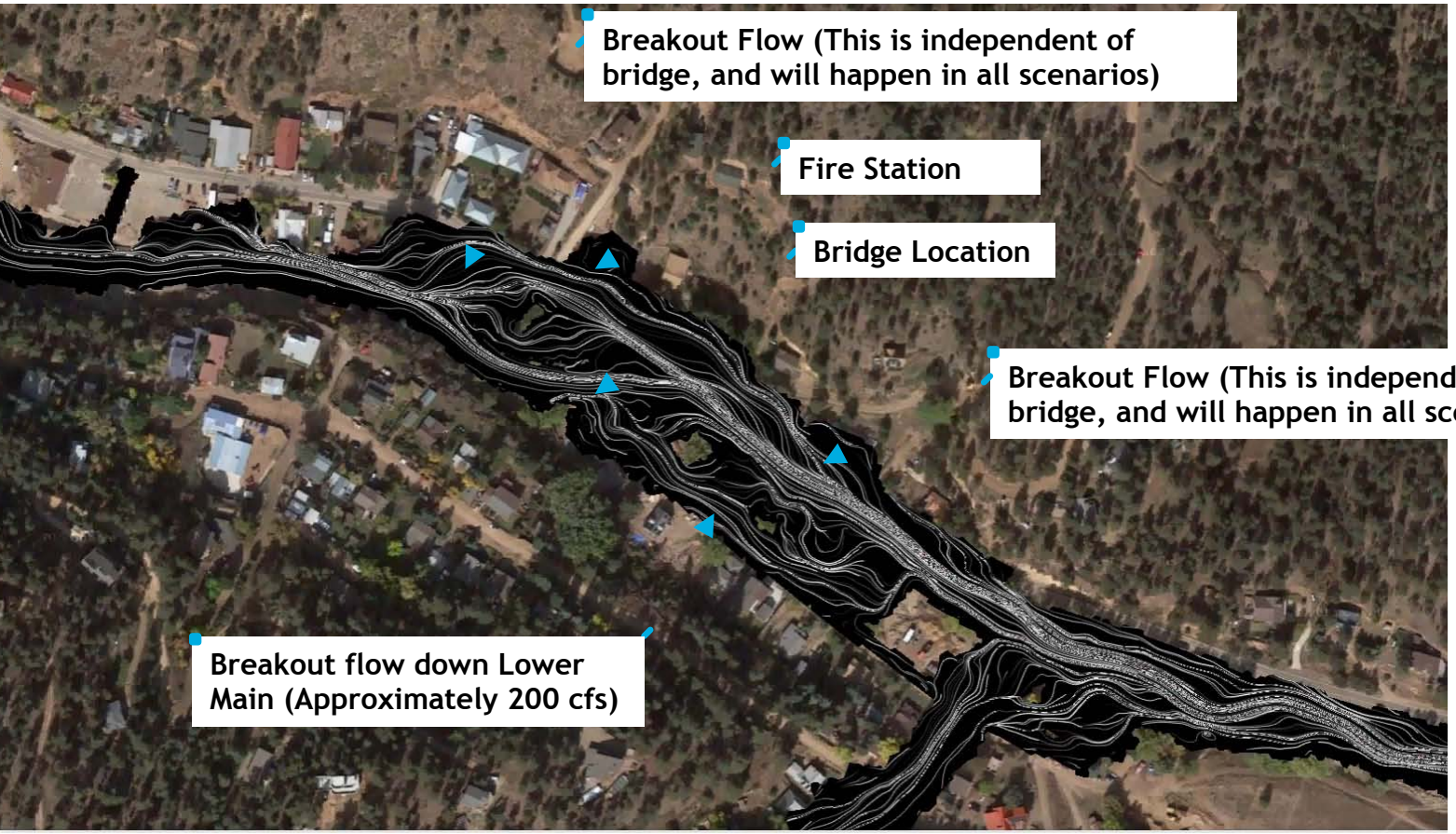
50-Year = 0 FT

10-Year = 2.4'

xisting Bridge



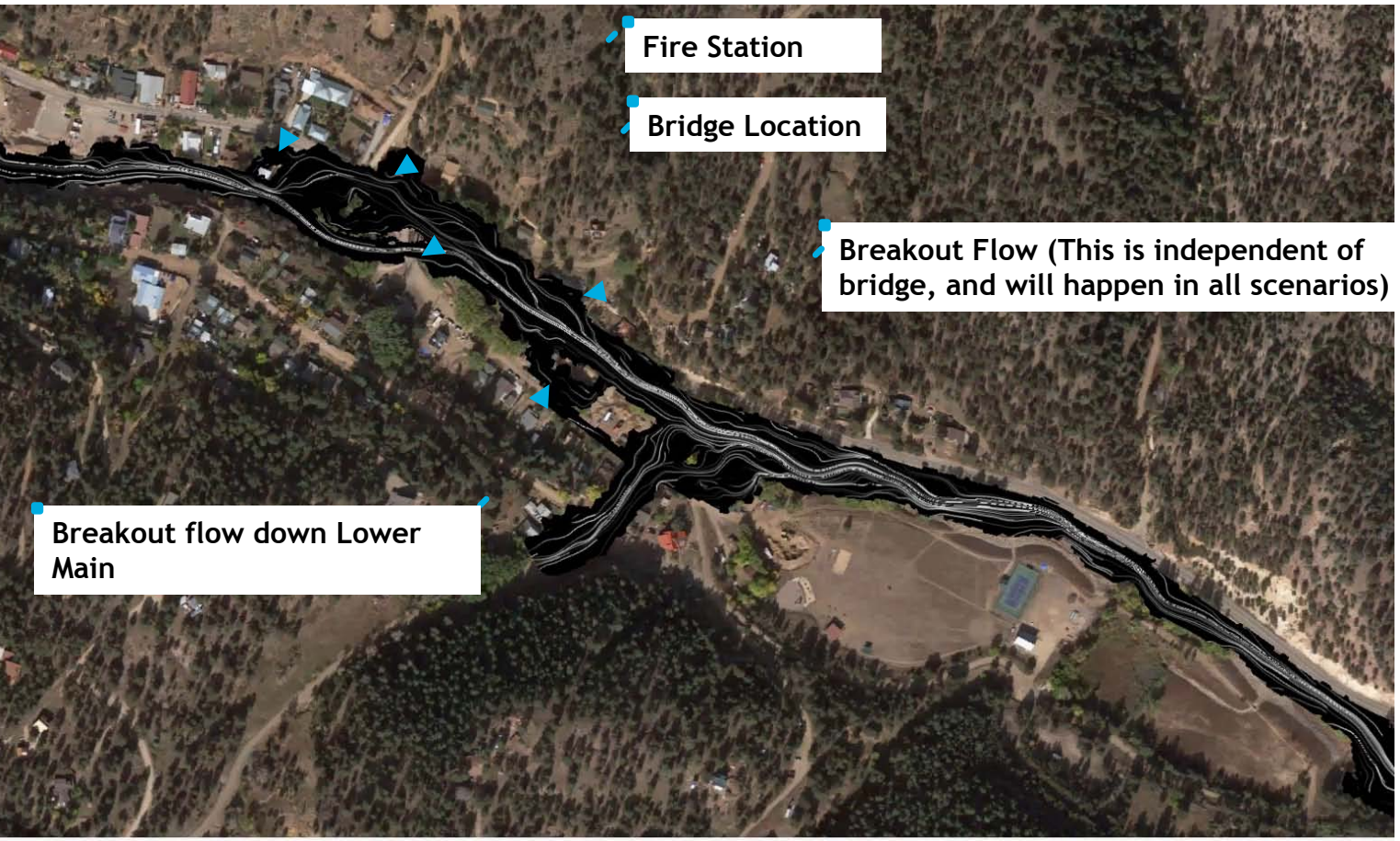
xisting Conditions – 100 Year Event (Clear Flow – No Debris)



James Creek Flow (cfs)
500-year event = 4834
100-year event = 2777
50-year event = 2095
25-year event = 1502
10-year event = 912

isting Conditions – 50 Year Event (Clear Flow – No Debris)

- Breakout Flow (This is independent of bridge, and will happen in all scenarios)



James Creek Flow (cfs)
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100-year event = 2777
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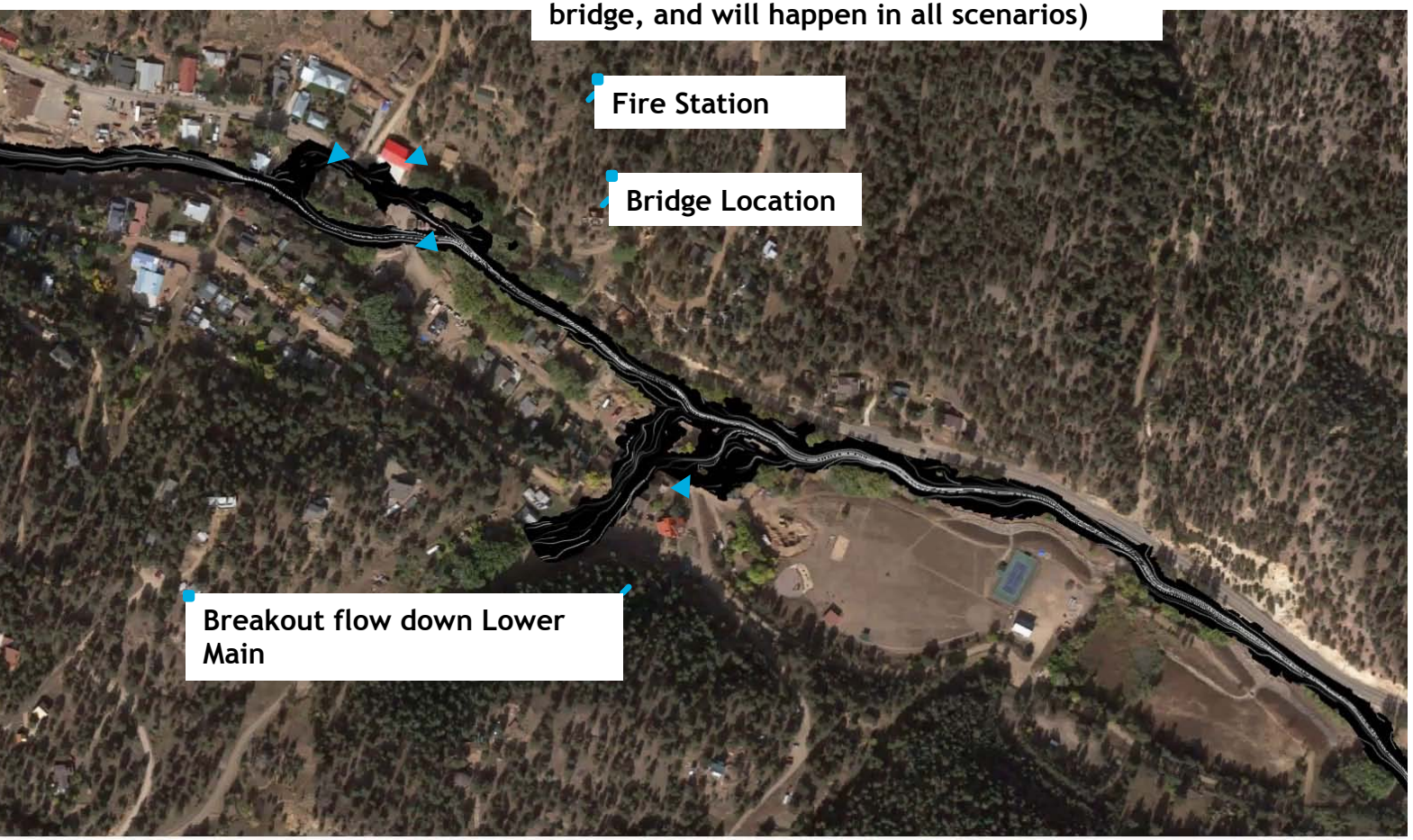
10-year event = 912

isting Conditions – 10 Year Event (Clear Flow – No Debris)



James Creek Flow (cfs)
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25-year event = 1502
10-year event = 912

ption 1 – New Bridge

DS

- Passes 100-year, clear flow
- Passes 100-year, debris flow
- Design life of new bridge would be 75 years.
- Constructible under current grant, except for the demolition costs.

NS

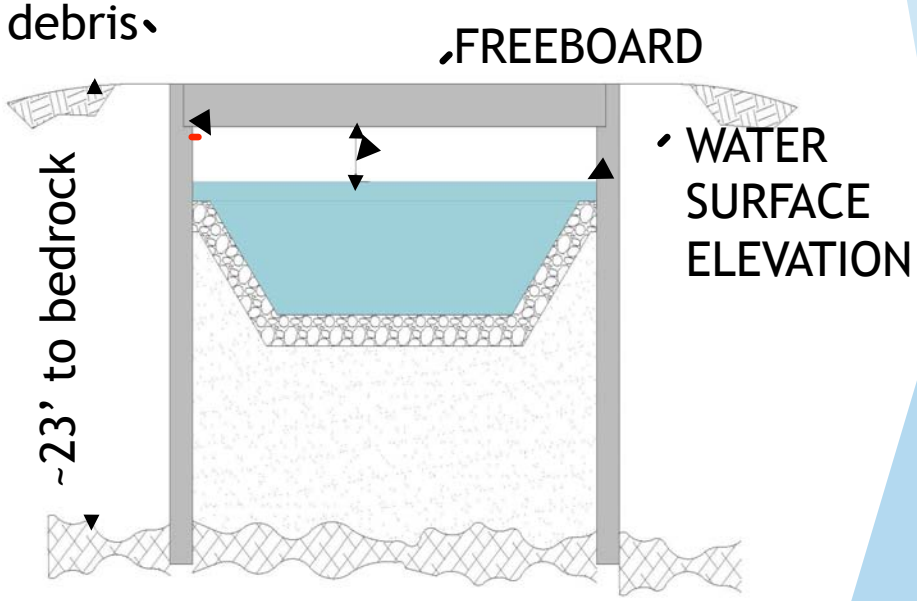
- Increases driveway slopes & requires moderate channel excavation.
- Requires a small amount of property acquisition or permanent easements.
- Highest construction cost, but still eligible under the current grant.

imated Construction Cost:

033,443* (includes 30% Contingency)

st does not include: Final design, Town inistration costs, construction management ts, property or easement acquisition.

FREEBOARD DURING 100-YEAR EVENT



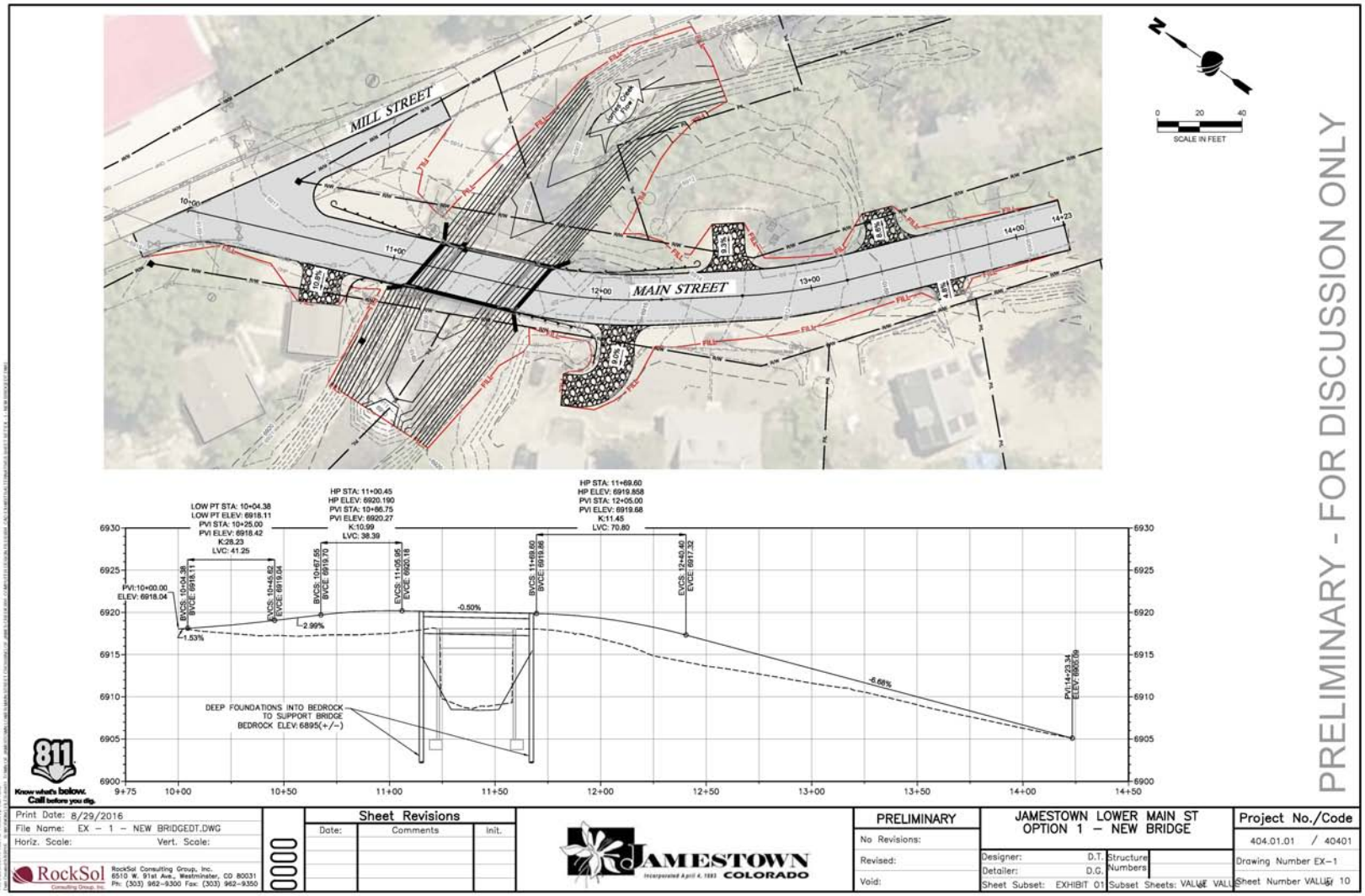
Freeboard Per Storm Event:

100-Year = 2.2 FT

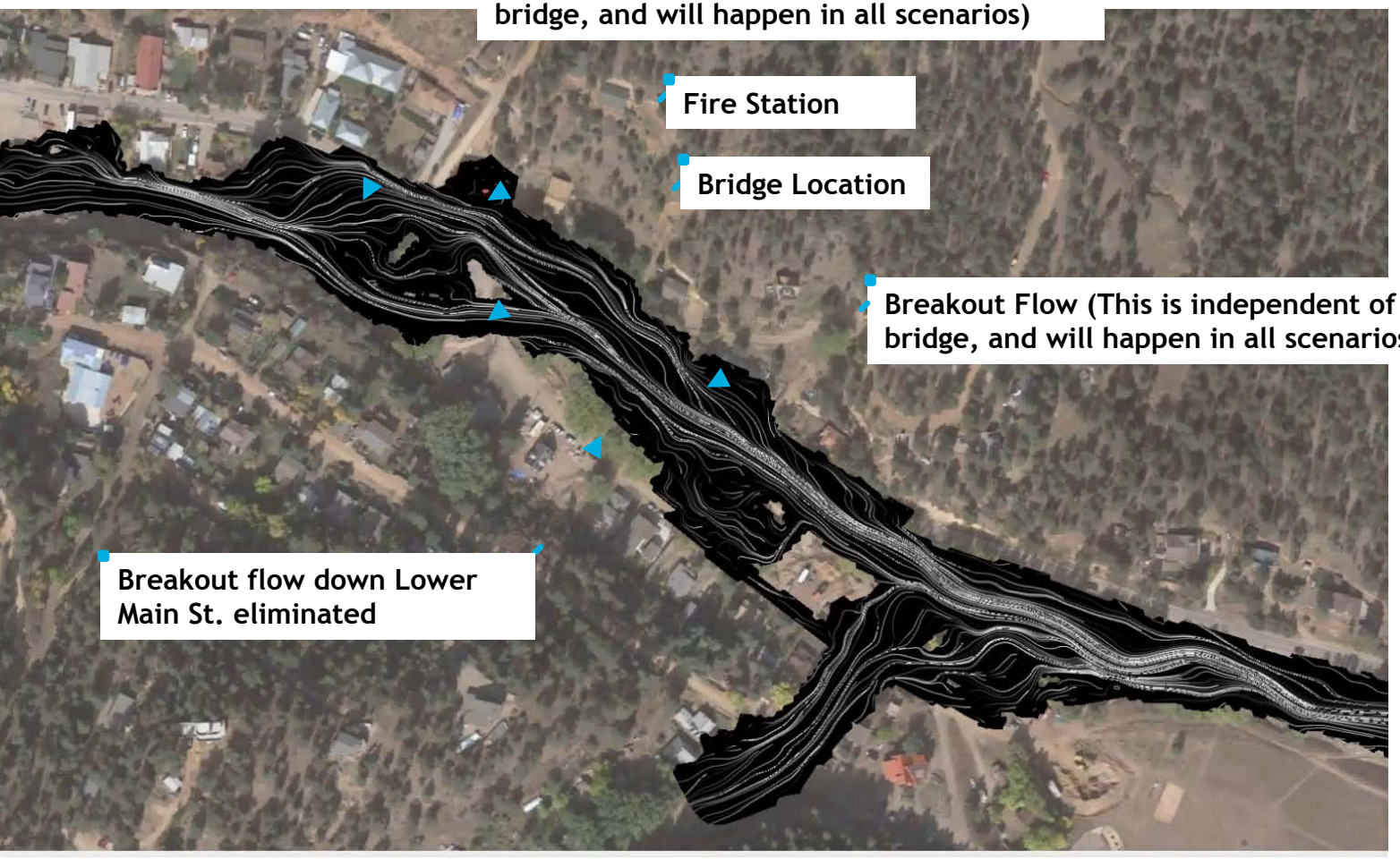
50-Year = 2.9 FT

10-Year = 5.0'

ption 1 – New Bridge



otion 1 – 100 Year Event (Clear Flow – No Debris)



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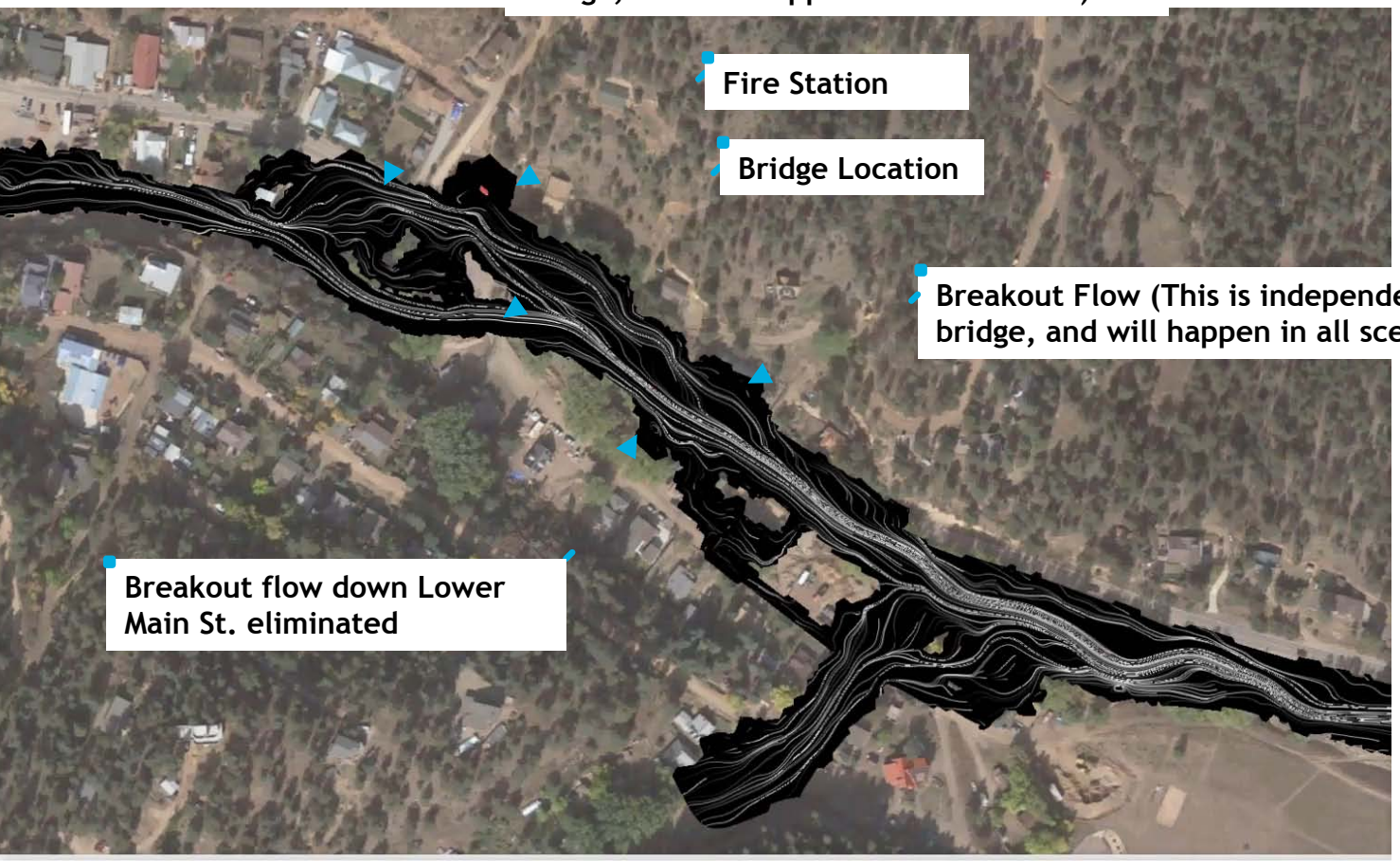

James Creek Flow (cfs)
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10-year event = 912

ption 2 – Raise Existing Bridge Deck

DS

- Passes 25 & 50-year, clear flow.
- Passes 25-year, debris flow.
- Minimal channel grading.

NS

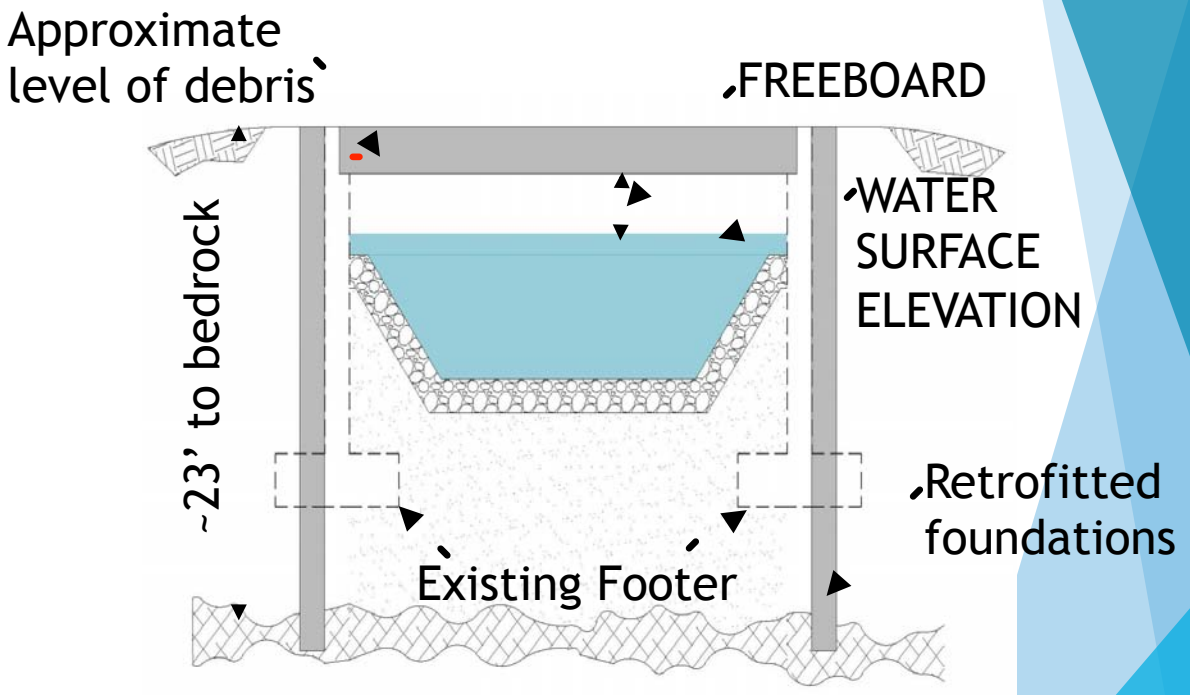
- Does not pass 100-year, clear flow.
- Does not pass 100-year, debris flow.
- Unlikely to pass 50-year debris flow.
- Requires retrofitting deep foundations.
- Increases driveway slopes.
- Requires a small amount of property acquisition or permanent easements.

imated Construction Cost:

3,287* (includes 30% Contingency)

st does not include: Final Design, Town inistration costs, construction management costs.

FREEBOARD DURING 100-YEAR EVENT



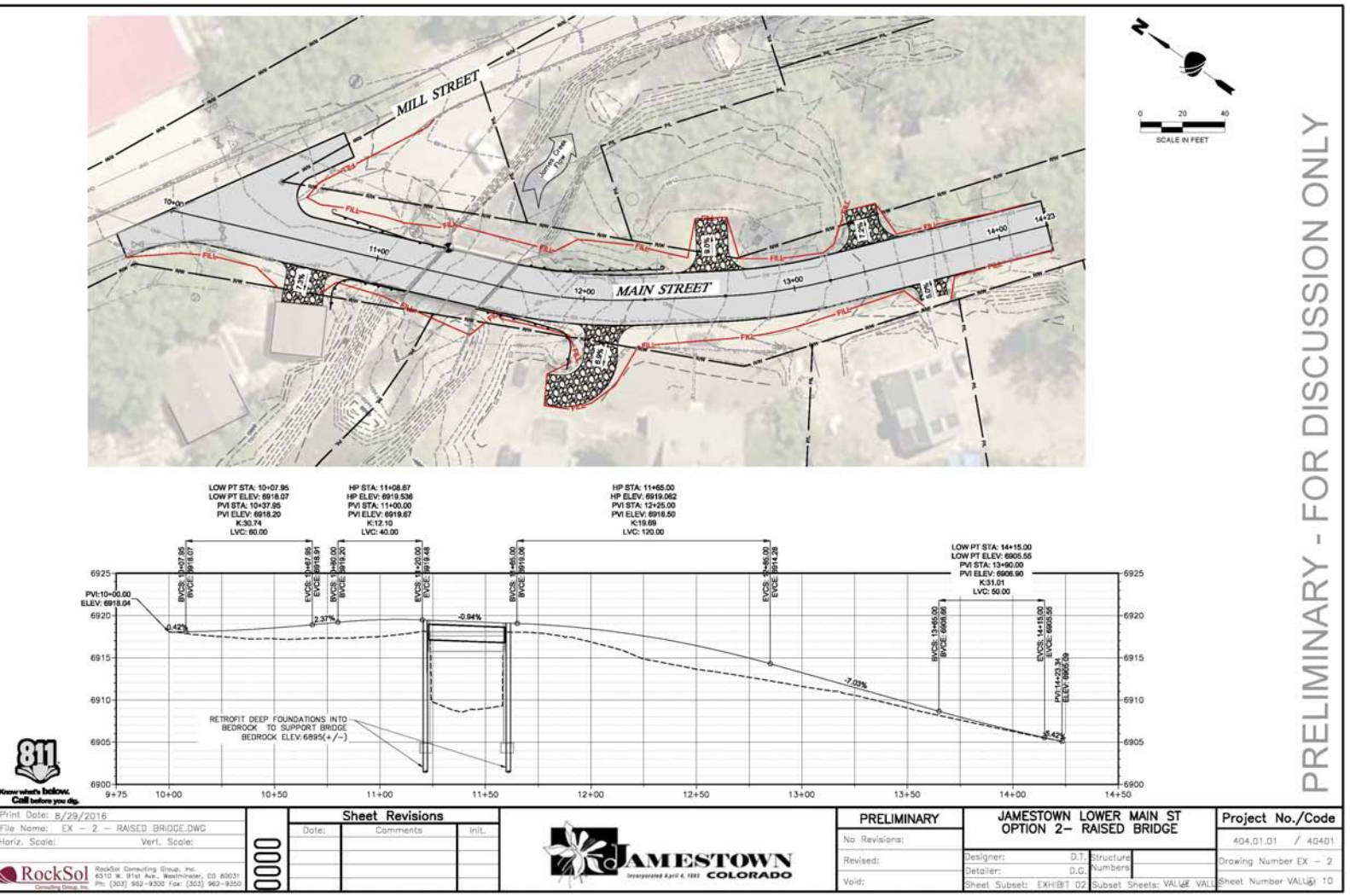
Freeboard Per Storm Event:

100-Year = 0 FT

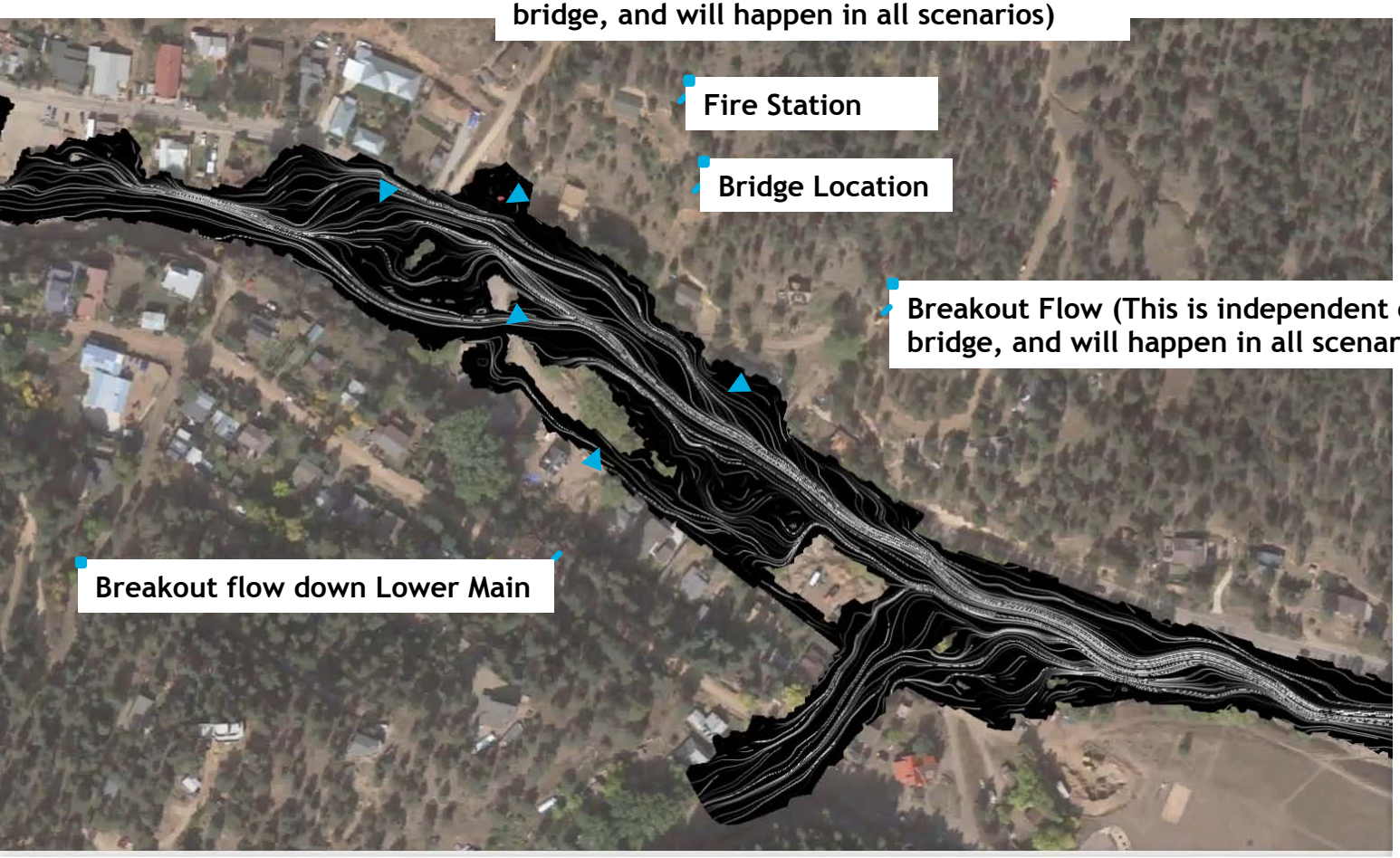
50-Year = 0.5 FT

10-Year = 3.6'

ption 2 – Raise Existing Bridge Deck



otion 2 – 100 Year Event (Clear Flow – No Debris)



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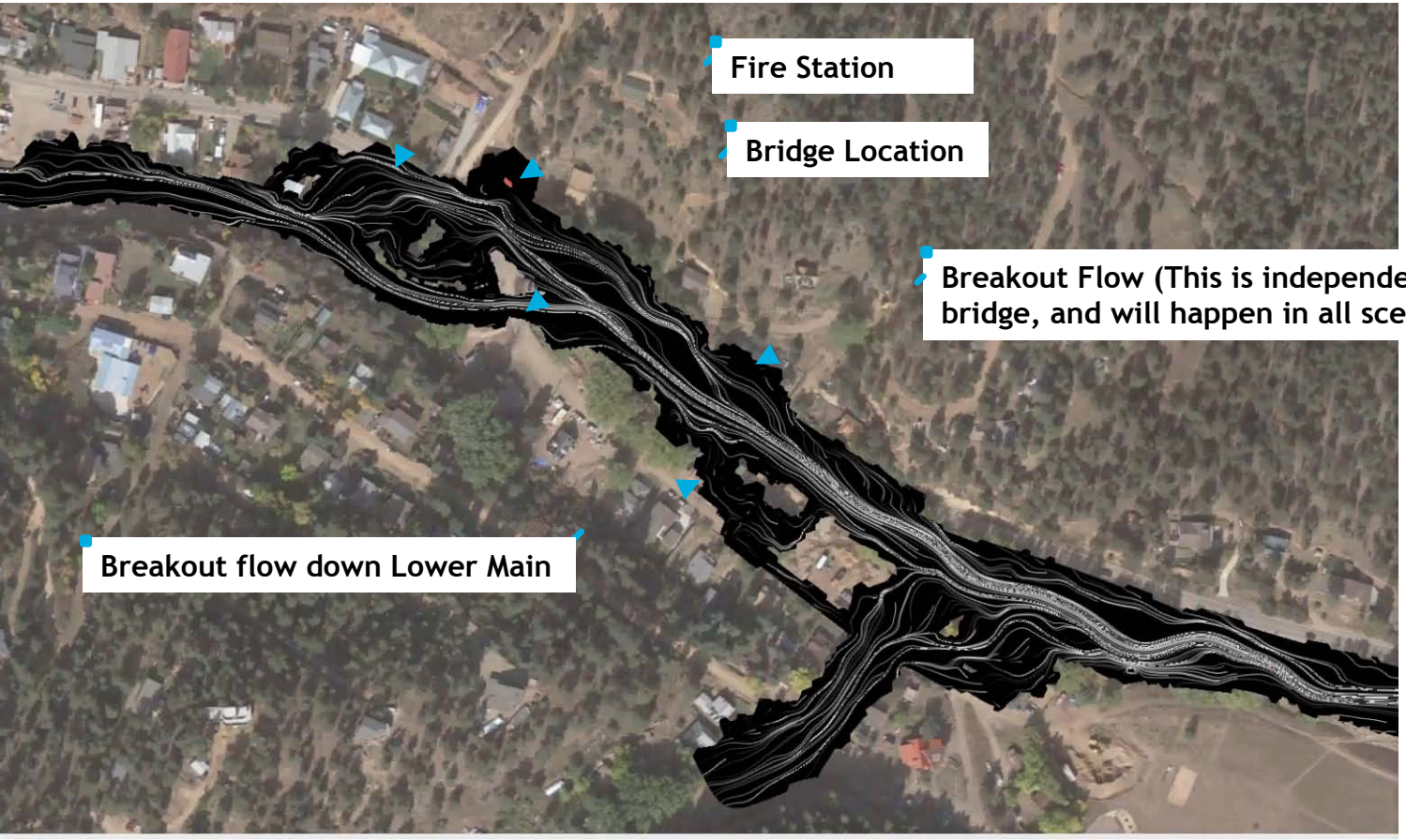
- Breakout Flow (This is independent of bridge, and will happen in all scenarios)



James Creek Flow (cfs)
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10-year event = 912

ption 3 – Additional Span

DS

- Passes 100-year, clear flow.
- Constructible under current grant.

NS

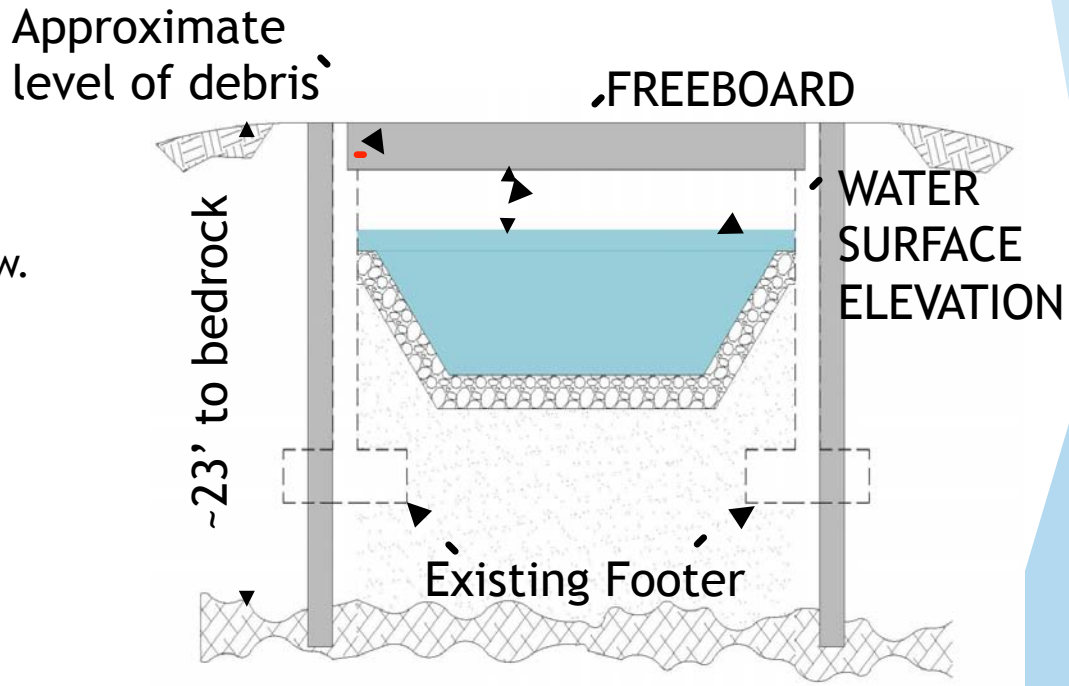
- Does not pass 100 or 50-year flow, debris flow.
- Creates a center pier that may catch debris.
- Requires retrofitting deep foundations.
- Increases driveway slopes & requires significant channel excavation.
- Requires property acquisition or permanent easements.

imated Construction Cost:

6,737* (w/30% Contingency)

st does not include: Final Design, Town inistration costs, construction management costs, perty or easement acquisitions.

FREEBOARD DURING 100-YEAR EVENT



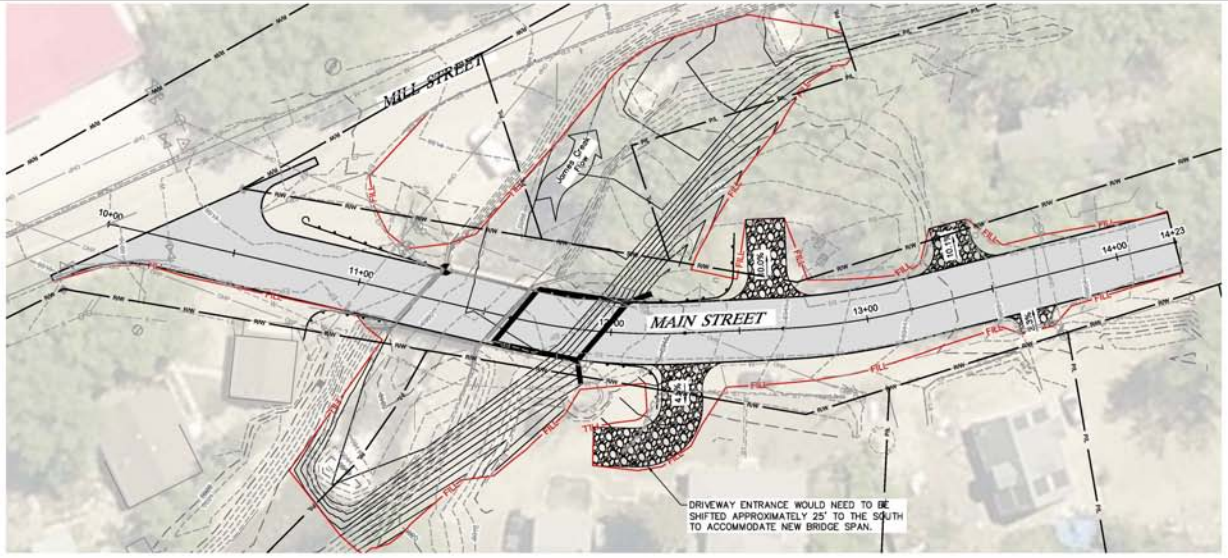
Freeboard Per Storm Event:

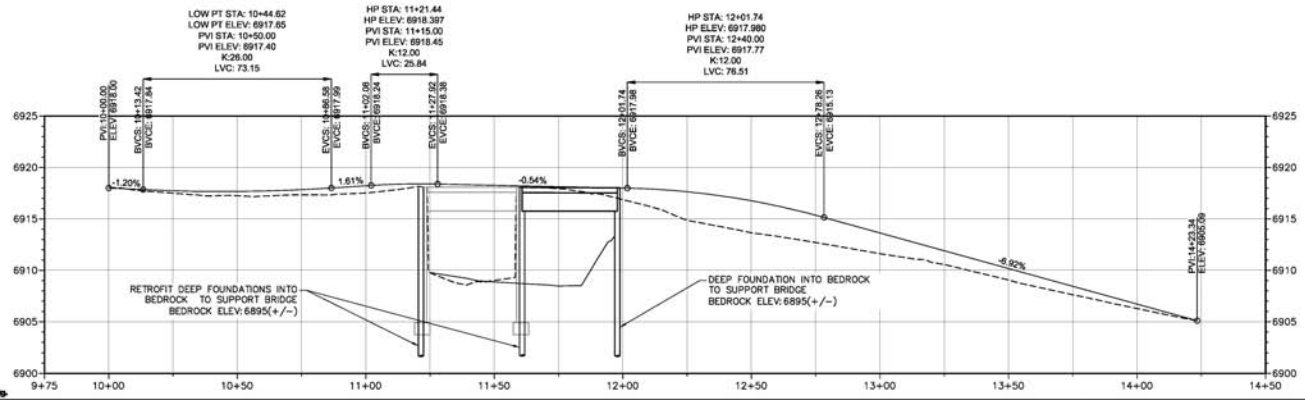
100-Year = 0.7 FT

50-Year = 1.5 FT

10-Year = 3.2'

ption 3 – Additional Span





PRELIMINARY - FOR DISCUSSION ONLY

811 Know what's below. Call before you dig.

Date: 8/29/2016
Name: EX – 3 – EXTEND BRIDGE.DWG
Scale: Vert. Scale:

RockSol Consulting Group, Inc. 6510 W. 91st Ave., Westminster, CO 80031 Ph: (303) 962-9300 Fax: (303) 962-9350

0000

Sheet Revisions		
Date:	Comments	Init.

JAMESTOWN Incorporated April 4, 1893 COLORADO

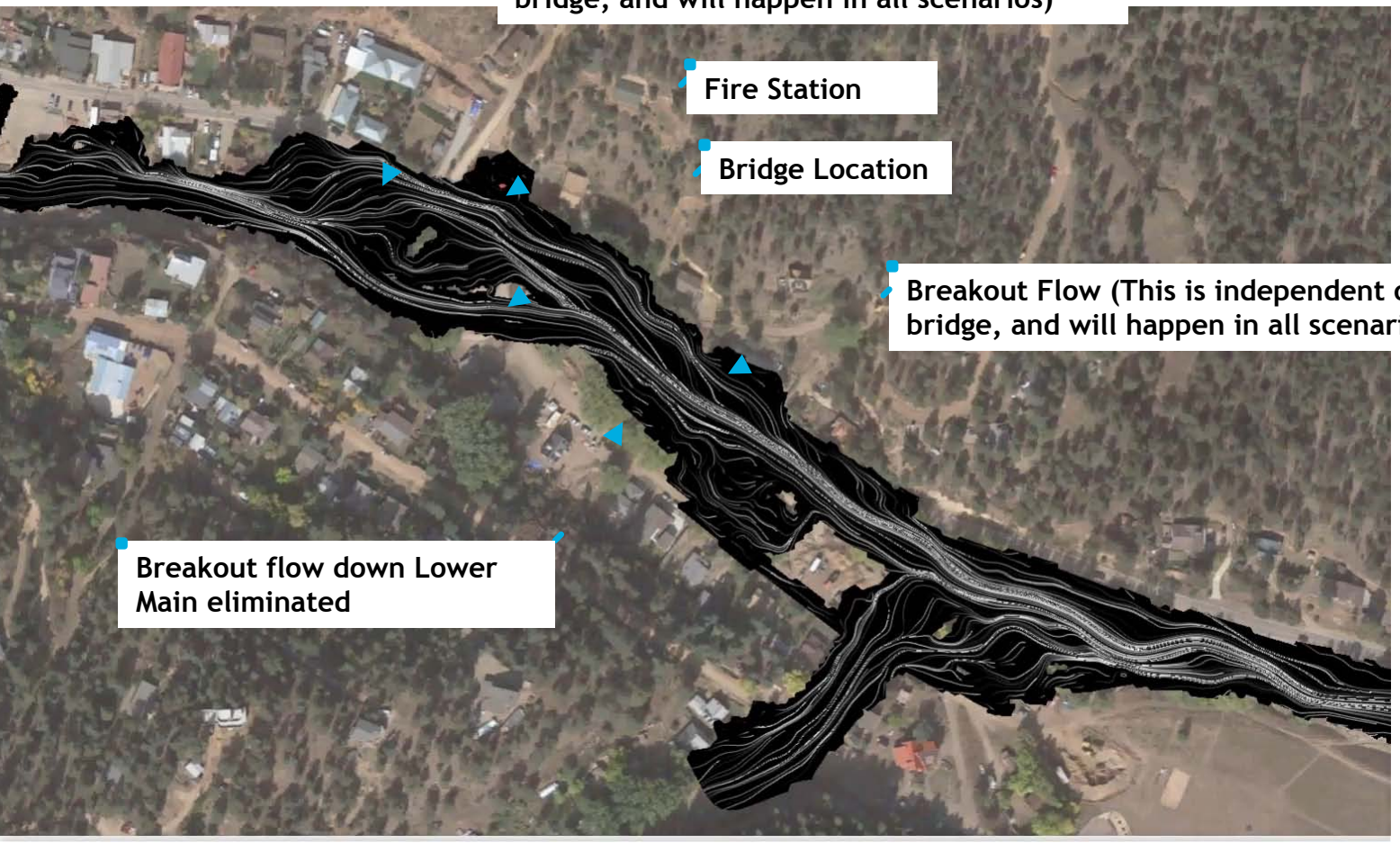
PRELIMINARY
No Revisions:
Revised:
Void:

JAMESTOWN LOWER MAIN ST
OPTION 3 – EXTEND BRIDGE

Designer: D.T.
Detailer: D.G.
Sheet Subset: EXHIBIT 03
Structure Numbers
Subset Sheets: VALUE VALUE

Project No./Code
404.01.01 / 40401
Drawing Number EX – 3
Sheet Number VALUE of 10

ption 3 – 100 Year Event (Clear Flow – No Debris)



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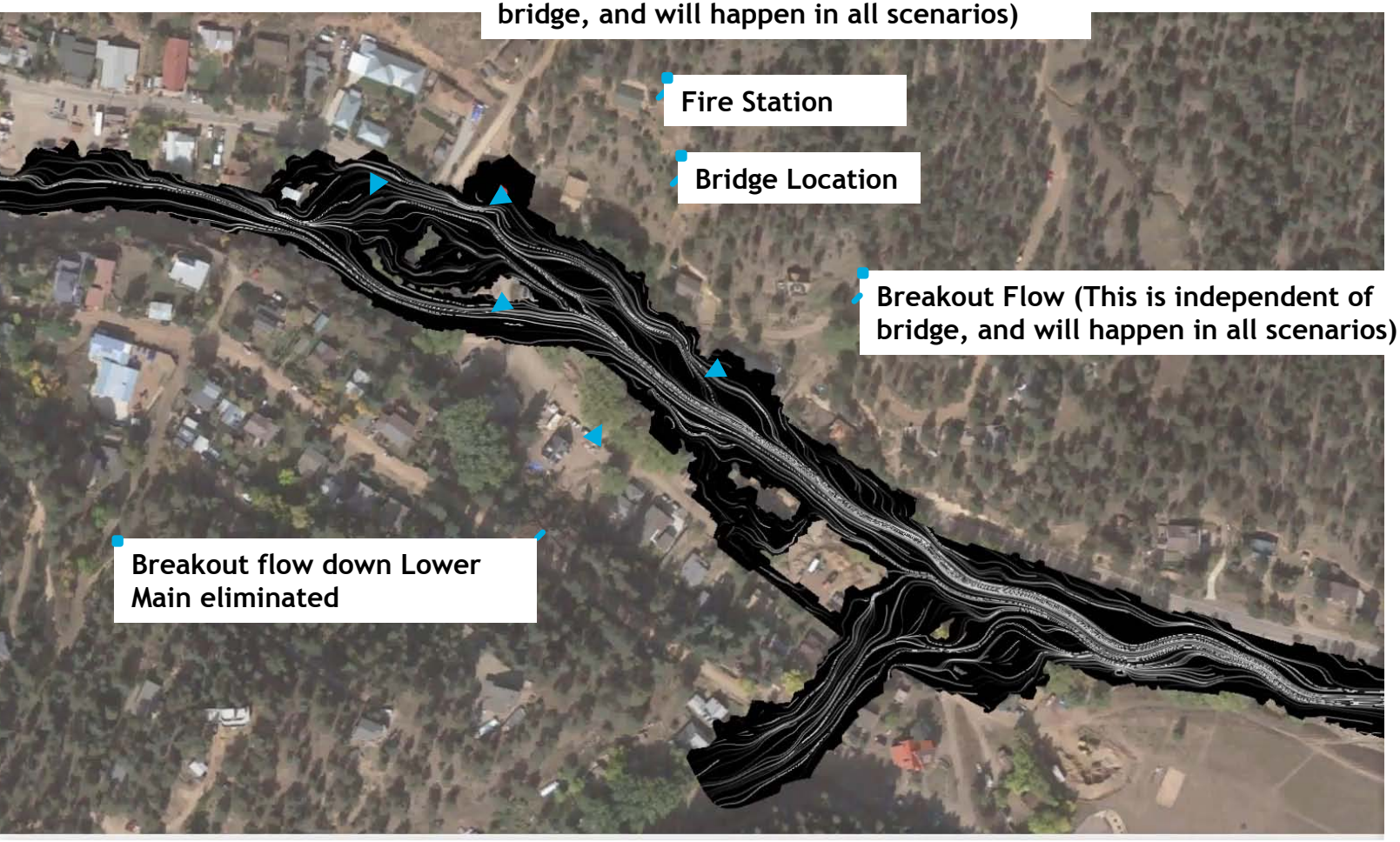

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ummary of Alternatives

DO NOTHING – EXISTING BRIDGE

- Does **not help to address** the problem (Existing Bridge does not pass the 100-year storm and has shallow foundations that are vulnerable to scour during a 50 or 100-year event.
- No upfront cost, but will require maintenance & inspection costs in the near future.

OPTION 1 – NEW BRIDGE

- **Helps to address** the problem (Passes 100 –Year Flow & Provides Required Freeboard).
- Construction Cost = $1,033,442 (FEMA grant money does not cover $$ for demolition).

OPTION 2 – RAISE EXISTING BRIDGE

- Does **not help to address** the problem (Does not pass clear flow and does not provide enough freeboard to allow floating debris to pass).
- Construction Cost = $663,287 (Feasible to construct under FEMA grant program).

OPTION 3 – ADDITIONAL SPAN

- Does **not help to address** the problem (Does not provide enough freeboard to allow floating debris to pass and center pier creates catchment point for debris).
- Construction Cost = $906,737 (Feasible to construct under FEMA grant program).

enefit Cost Analysis

In order to obtain FEMA Phase 2 funding for this project, we must justify our proposed alternative & cost through a Benefit Cost Analysis (BCA).

The following items are just a few of the costs evaluated in the BCA:

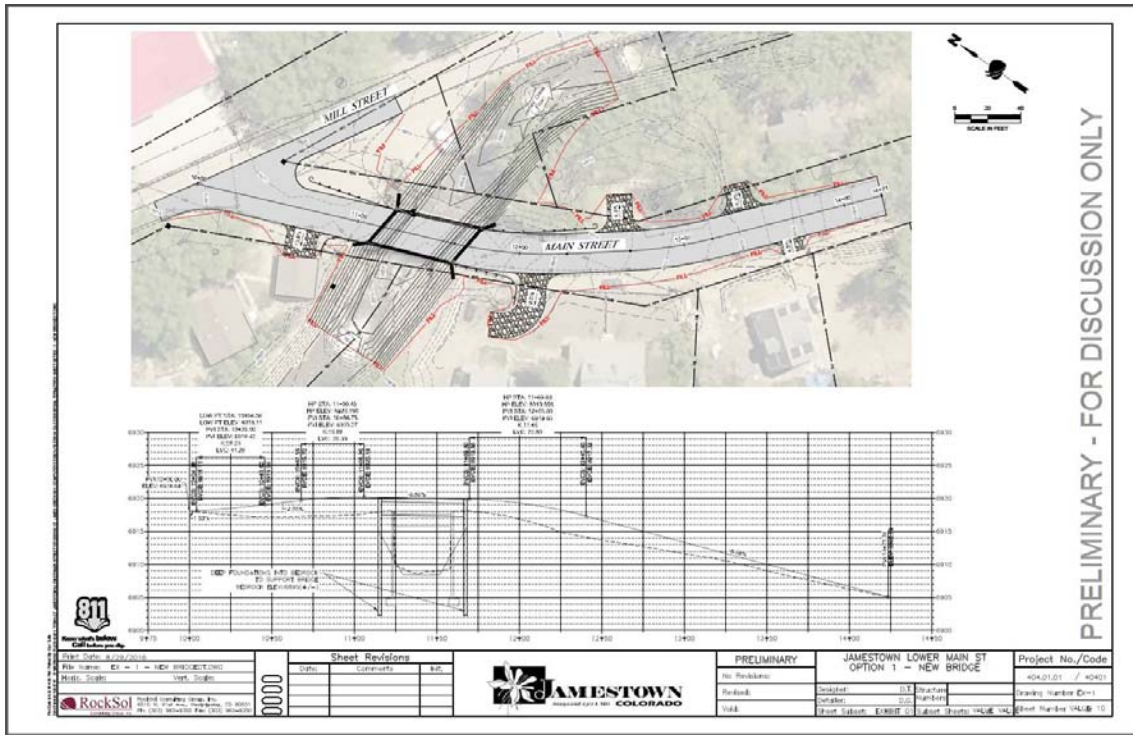
- Loss of life
- Injuries
- Property Damage
- Damage to public infrastructure
- Cost of future maintenance

Each of these items have an assigned dollar amount that is used to determine whether or not the benefits of the new improvements outweigh the cost of the bridge alternative.

esign Team Recommendation

After fully investigating and analyzing the existing conditions and potential alternatives, the RockSol team recommends that the Town pursue Option 1 – New Bridge.

While the other options do provide some benefits, only this option attempts to fully address the problem, which is to: ***Increase the capacity of the creek crossing to pass the 100-year storm event to reduce the risk of similar damage in a future flood.***



ext Steps

Town Board direction on preferred alternative – October 3, 2016

Prepare 60% design plans, specification, and estimate – October – December 2016

Finalize BCA analysis, Hydraulics & Geotechnical work – October – December 2016

Submit final package to FEMA for approval and award of Phase 2 funding to proceed with final design and construction – December 23, 2016

Thank You!

QUESTIONS??