WEST YOST
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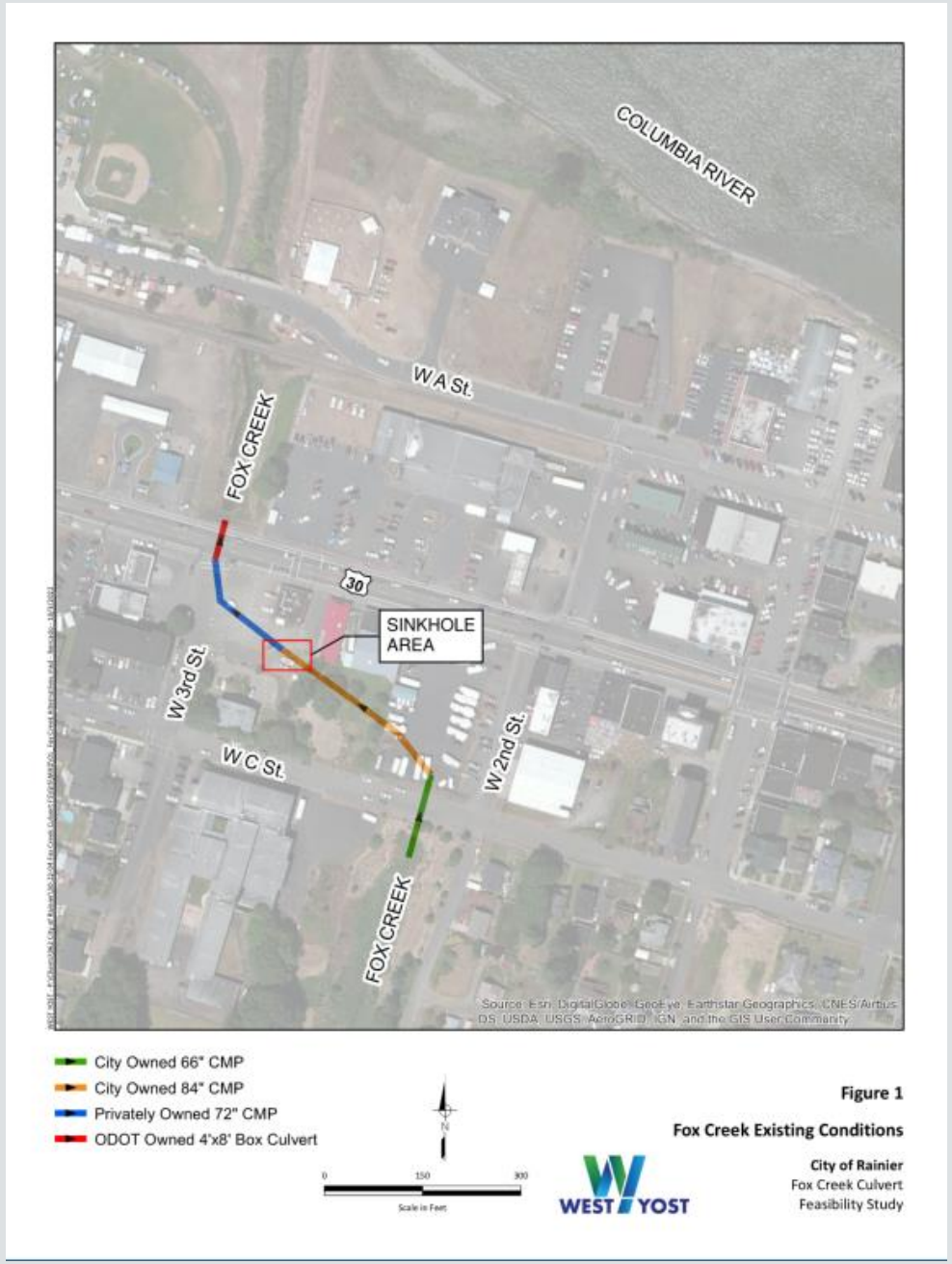
City of Rainier
Fox Creek Culvert Feasibility Study

December 5, 2022

Presentation Overview

- Background Information
- Overview and Description of Alternatives
- Conclusions of Alternatives
- Recommendations and Next Steps

Looking upstream at the Fox Creek from W. C Street



Location Map

- Complex Ownership with City, ODOT and private segments
- Bisects many local businesses:
  - Don Pedro's Mexican Restaurant
  - Earth-N-Sun Wood Stove Shop
  - Rainier RV Center
  - Chevron
- Crosses Highway 30 (ODOT)
- Outlets to Fox Creek in area previously improved

How did we get here?

2015: Heavy rain event caused debris to accumulate in the culvert leading to flooding on Hwy 30 and a sink hole developed in the private segment of the exist. culvert

2016-2017: Emergency culvert repair completed.

- ODFW sent notice to City for culvert being a fish passage barrier.
- The deadline to address these ODFW requirements has now passed

2019: Heavy rain event caused significant local flooding between W C Street and Hwy 30

2020: Hydraulic evaluation was completed and determined the Fox Creek culvert is undersized, in addition to being a barrier for fish passage.

Current: Feasibility Study by West Yost has developed 3 alternatives (5 options) with various sizes and configurations to resolve flooding and fish passage barrier issues.

- Replacement and upsizing of the exist. Hwy. 30 box culvert is anticipated to be a separate project completed by ODOT.

Overview of Alternatives

- Alternative 1 - Hydraulic Design Approach
  - Based on criteria for minimum flow depth and maximum velocity for fish species
  - Design to provide the **minimum size** structure
  - May not meet requirements for fish passage

  Alternative 1a – Box culvert with open channel section

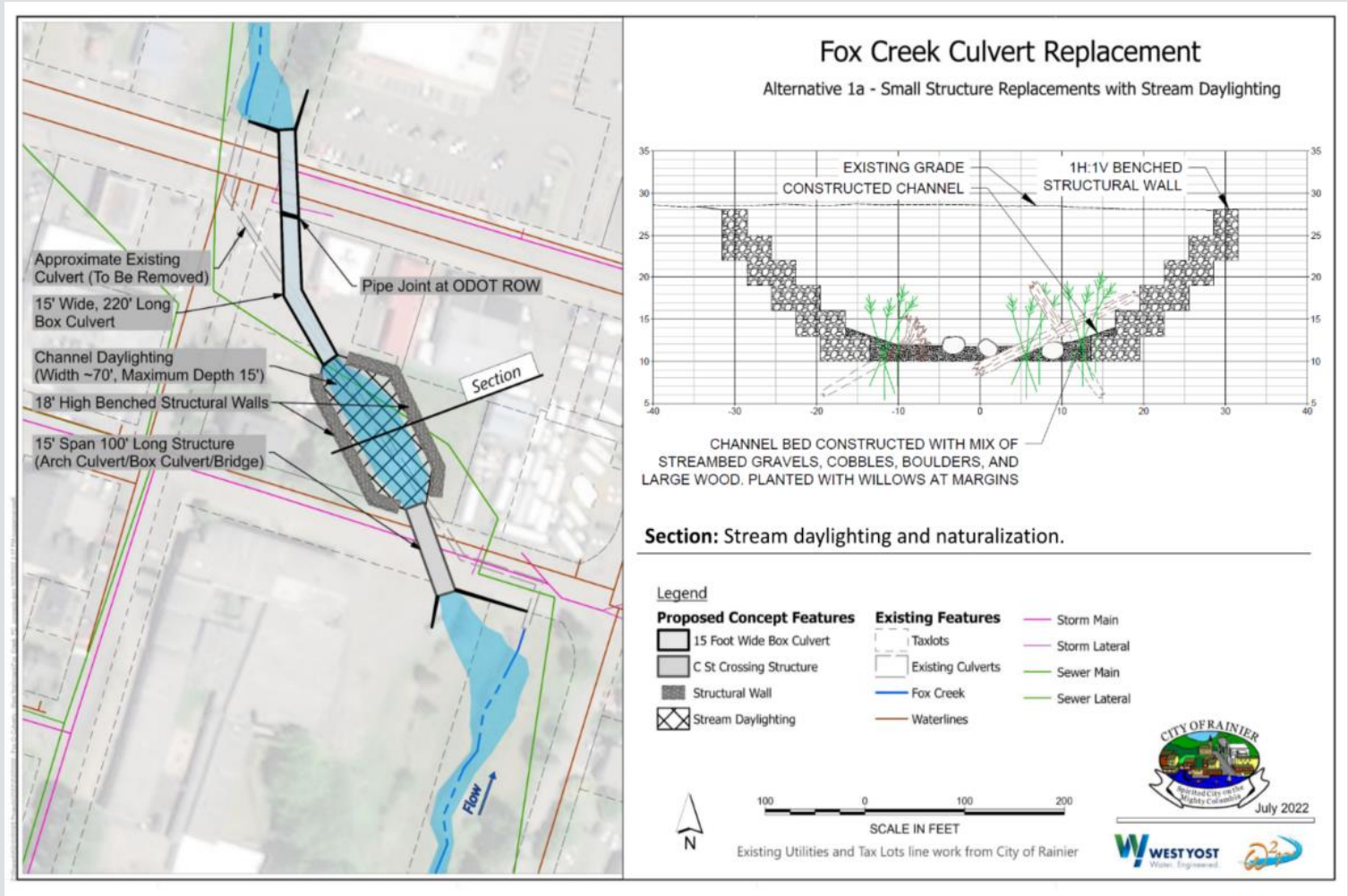
  Alternative 1b – Continuous box culvert
- Alternative 2 - Stream Simulation Design Approach
  - Preferred by state and federal agencies
  - Mimic natural conditions upstream and downstream of the culvert (slope, substrate, channel width …),
  - Requirement: new structure span to be 1.5 times the active channel width.

  Alternative 2a – Large arch culvert with open channel section

  Alternative 2b – Continuous large arch culvert
- Alternative 3 – Maximize Daylighting
  - Use the Stream Simulation approach
  - Maximize open channel section
- These alternatives do not include costs for ODOT box culvert replacement.

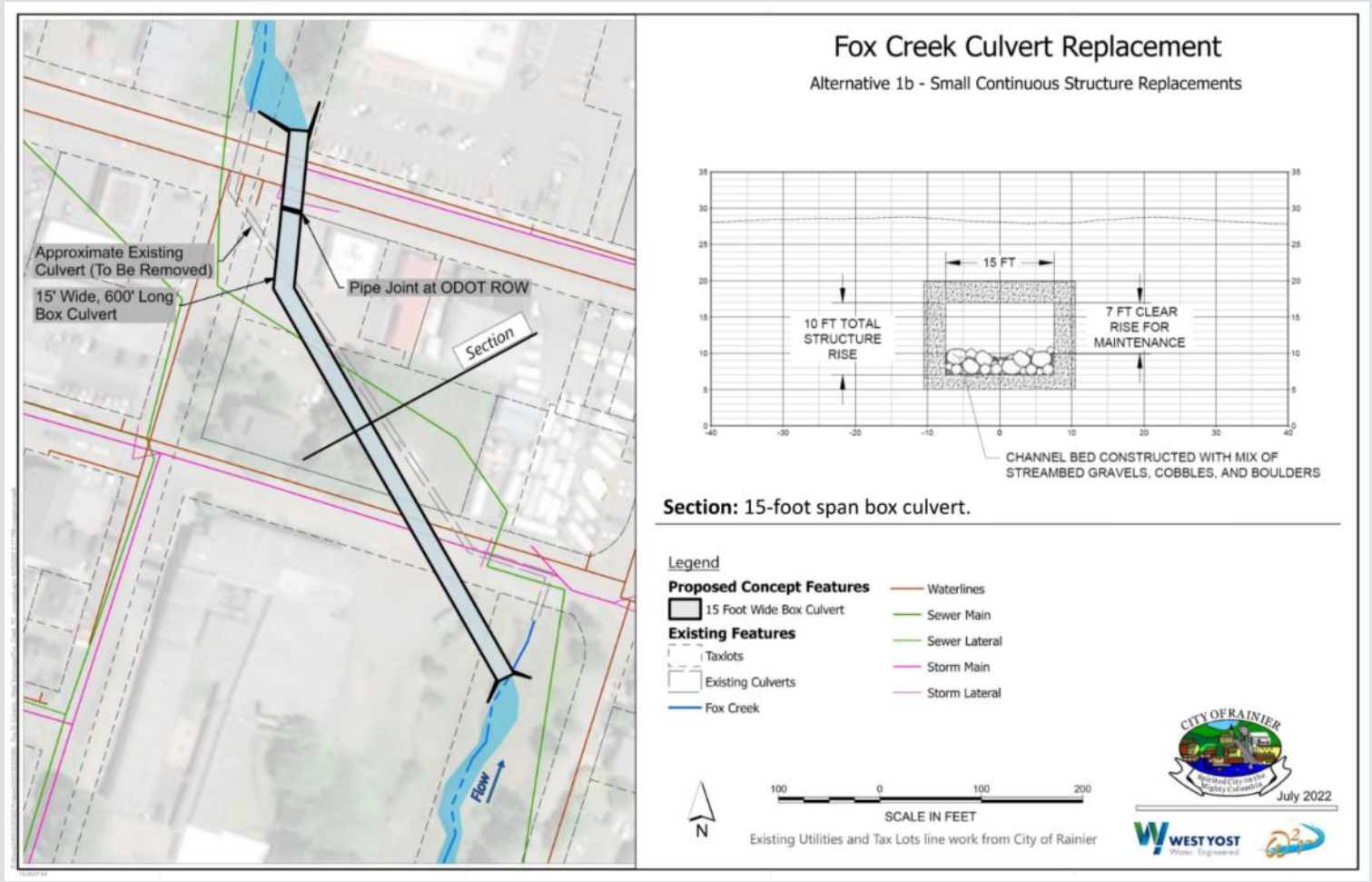
Description of Alternatives 1a – Small Structure with Stream Daylighting

- **City Segment:** 15’ wide by 100’ long box culvert under W. C Street
- **ODOT Segment:** 15’ wide by 100’ long box culvert on Hwy 30
- **Private Segment:** Mix of open channel and 15’ wide box culvert
- **Estimated Cost: $6,540,000**
- **Benefits/Risks:**
  - 15’ span may not meet future revision of fish passage requirements by ODFW
  - Difficult maintenance of the culvert due to small size



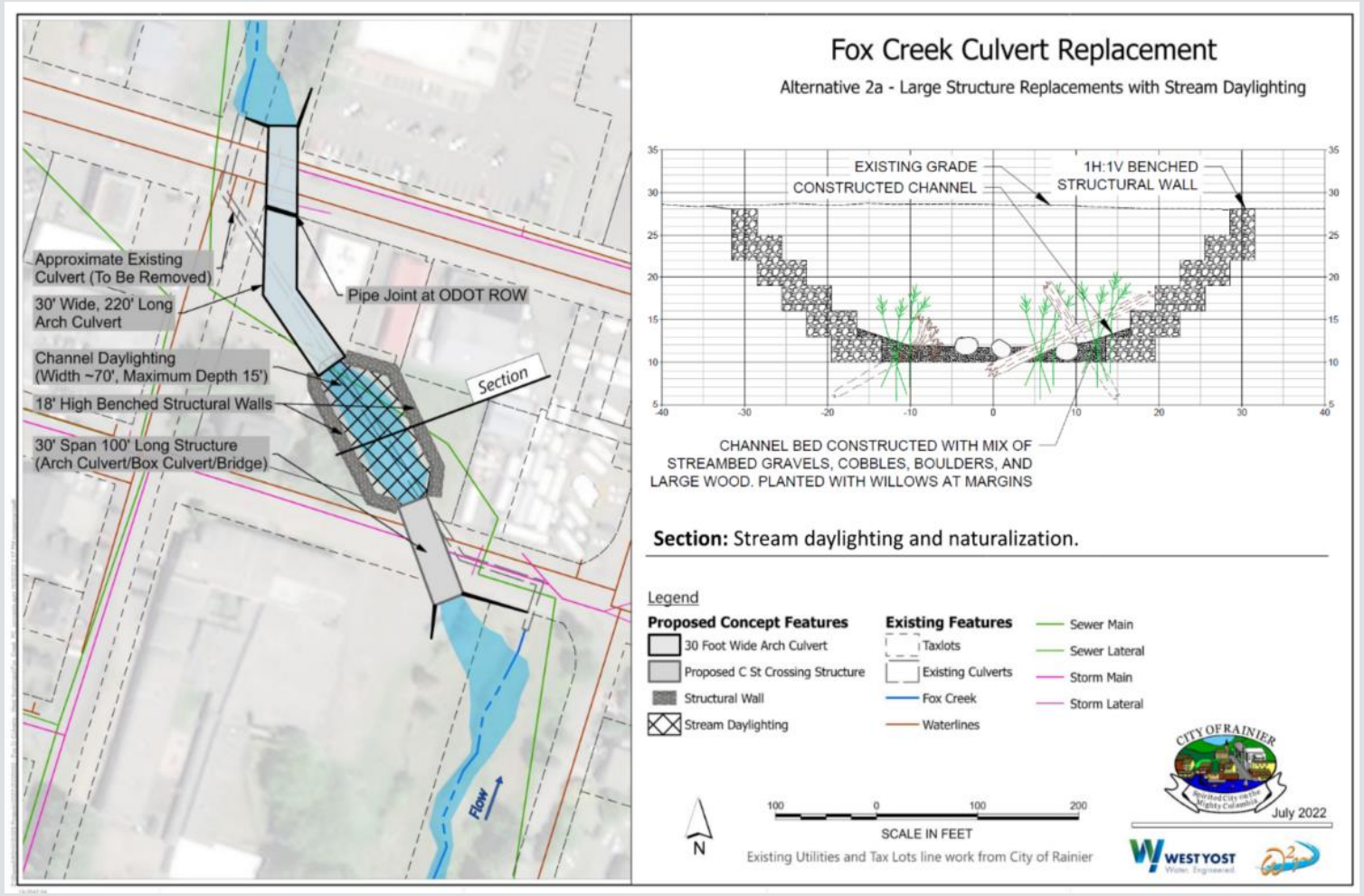
Description of Alternatives 1b – Small Continuous Culvert

- **Segment:** Continuous 15’ wide by 600’ long box culvert
- 10’ high structure with 7’ clearance
- **Estimated Cost: $7,190,000**
- **Benefits/Risks :**
  - 15’ span may not meet future revision of fish passage requirements by ODFW
  - Difficult maintenance of the culvert due to small size



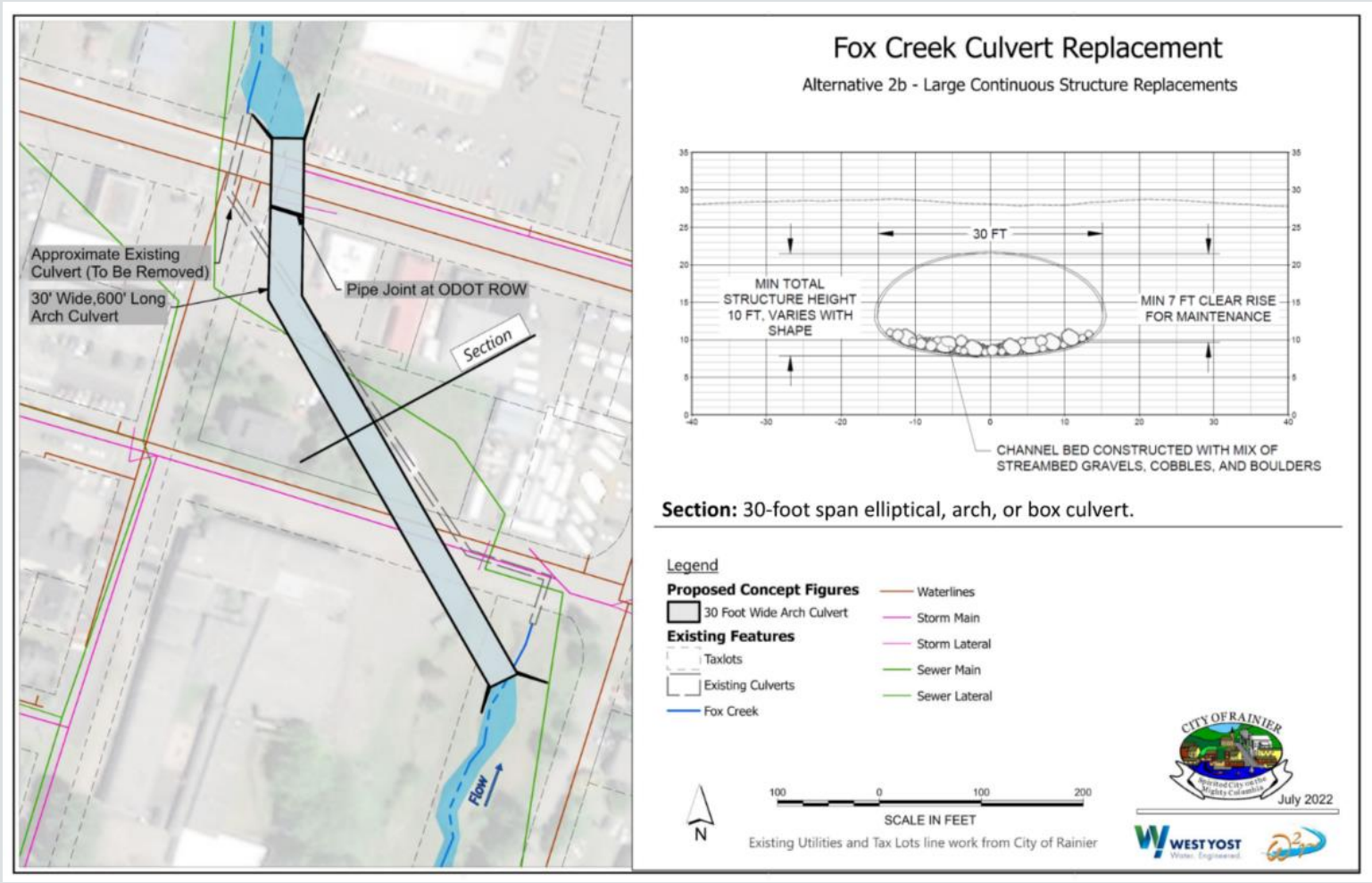
Description of Alternatives 2a – Large Structure with Stream Daylighting

- **City Segment:** 30’ wide by 100’ long arch culvert under W. C Street
- **ODOT Segment:** 15’ wide by 100’ long bridge/culvert on Hwy 30
- **Private Segment:** Mix of open channel and 30’ wide arch culvert
- **Estimated Cost: $7,530,000**
- **Benefits/Risks :**
  - 30’ span meets likely fish passage requirements
  - Best option for long-term maintenance



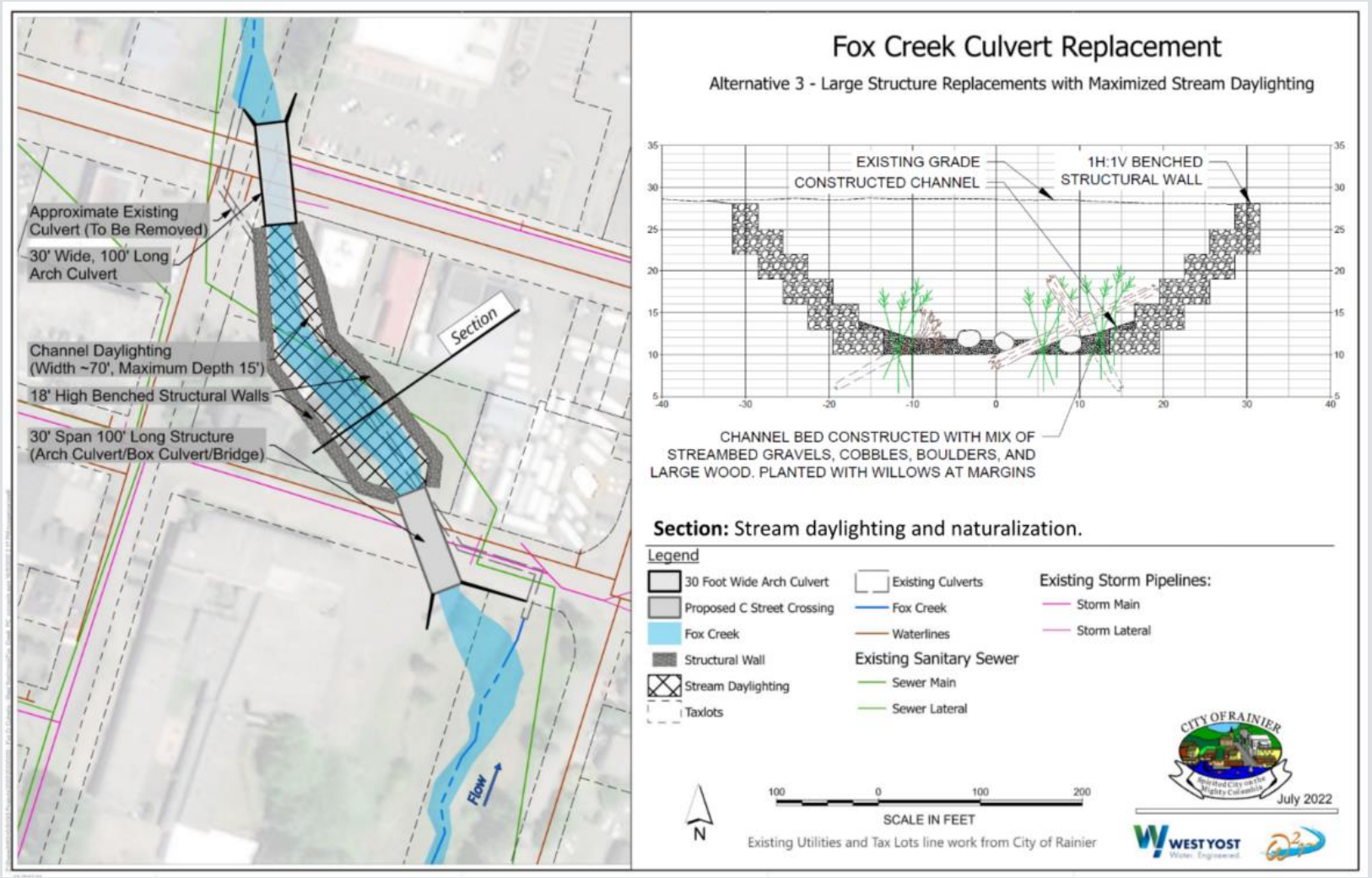
Description of Alternatives 2b – Large Continuous Culvert

- **Segment:** Continuous 30’ wide by 600’ long arch culvert
- 10’ high structure with 7’ clearance
- **Estimated Cost: $8,980,000**
- **Benefits/Risks :**
  - 30’ span meets likely fish passage requirements
  - Best option for long-term maintenance
  - Most expensive option



Alternative 3 – Maximize Open Channel

- **City Segment:** 30’ wide by 100’ long arch culvert under W. C Street
- **ODOT Segment:** 30’ wide by 100’ long bridge/culvert on Hwy 30
- **Estimated Cost: $6,790,000** (does not include real estate acquisition)
- **Benefits:**
  - Maximizes open channel segment and minimizes culvert segments
  - 30’ span meets likely fish passage requirements
  - Lowest cost option
  - Best option for long-term maintenance
- **Challenges:**
  - Impacts Don Pedro’s Mexican Restaurant



Conclusions

- Alternative 1 is lowest cost for passage hydraulic design flow, but are not considered viable due to fish passage limitations and permitting
- Alternatives 2a and 2b better for permitting, but higher cost
  - Wider structure will function better under high flows and provide natural sediment and log/debris transport
  - Lower hydraulic scour forces and reduced likelihood of streambed material loss
  - Improved O&M access results in lower long-term maintenance costs
- Alternative 3 is best option for culvert replacement, but impacts local businesses
  - Better fish passage conditions
  - Visible/tangible public amenity and park setting benefits
  - Maximizing the extent of daylighting is expected to be more cost effective and beneficial to stream habitat.

Recommendations & Next Steps

- Proceed with further evaluation of Alternative 2b or Alternative 3
- Identify funding sources and complete grant applications for next phase of work
- Complete Phase 1 Environmental Study and conduct additional geotechnical investigations
- Continue coordination with ODOT for Hwy 30 culvert replacement
- Discuss potential options/opportunities with local businesses and private property owners

THANK YOU

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