WATER QUALITY TECHNICAL MEMORANDUM

April 2014

EB I-70 Peak Period Shoulder Lane

CATEGORICAL EXCLUSION

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Acronyms and Abbreviations

BMP	Best Management Practice
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CF	Cubic feet
CSS	Context Sensitive Solutions
CY	Cubic Yards
DRCOG	Denver Regional Council of Governments
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
Mg/L	Milligrams per Liter
MOU	Memorandum of Understanding
MP	Milepost
MS4	Municipal Separate Stormwater Sewer System
PEIS	Programmatic Environmental Impact Statement
PPSL	Peak Period Shoulder Lane
ROD	Record of Decision
ROW	Right-of-Way
SCAP	Sediment Control Action Plan
SH	State Highway
SWEEP	Stream and Wetland Ecological Enhancement Program
SWMP	Stormwater Management Plan
UCCWA	Upper Clear Creek Watershed Association

Section 1. Purpose of the Memorandum

The Federal Highway Administration (FHWA), in cooperation with the Colorado Department of Transportation (CDOT), is preparing a Categorical Exclusion for proposed changes to the eastbound lanes of I-70 between approximately milepost (MP) 230 and MP 243, in Clear Creek County, Colorado. The proposed changes will improve operations and travel time reliability in the eastbound direction of I-70 in the project area. Additionally, the improvements will be consistent with the *I-70 Mountain Corridor Programmatic Environmental Impact Statement* (PEIS) *Record of Decision* (ROD), I-70 Mountain Corridor Context Sensitive Solutions (CSS) process, and other commitments of the PEIS. The Proposed Action fits within the definition of "expanded use of existing transportation infrastructure in and adjacent to the corridor" as an element of the Preferred Alternative Minimum Program.

This technical memorandum discusses the regulatory setting and describes the affected environment and the impacts of the Proposed Action on water quality within the identified study area. This memorandum also documents mitigation measures, including applicable measures identified in the *I-70 Mountain Corridor PEIS* (CDOT, 2011b), which would reduce impacts during construction and operation. The *I-70 Mountain Corridor PEIS* identified comprehensive improvements for the corridor. The Proposed Action would immediately address mobility and operations in the eastbound direction between Empire Junction and east Idaho Springs, but would not address all of the transportation needs in this area. The Proposed Action would not preclude other improvements needed and approved by the I-70 Mountain Corridor PEIS ROD.

Section 2. What Process Was Followed to Analyze Water Quality?

2.1 Methodology

CDOT has established three corridor-specific programs to gather information on water resources within the Corridor:

1. The Stream and Wetland Ecological Enhancement Program (SWEEP) to identify water-related issues, with immediate attention given to the Clear Creek portion of the Corridor.
2. The I-70 Water Quality Monitoring Program to sample and quantify existing impacts.
3. The Sediment Control Action Plan (SCAP) for Clear Creek to develop mitigation strategies for sediment loading resulting from roadway runoff.

Water quality issues within the I-70 Corridor were identified through public and agency coordination, and by collecting data and information from the corridor-specific programs listed above.

The methodology used to assess potential impacts to water quality associated with the Proposed Action includes:

- Evaluate existing drainage patterns and water quality conditions.
- Document existing drainage infrastructure and management of drainage.
- Assess changes that may occur during and after construction of the Peak Period Shoulder Lane (PPSL).
- Evaluate potential water quality mitigation strategies so that water quality remains unchanged or is improved by the project.

Sedimentation is a concern for Clear Creek as identified by the SWEEP committee (CDOT et al., 2011). Improvement to water quality is focused on reducing sedimentation through the capture of highway-applied traction sand and a reduction in hill slope erosion.

This CDOT project is one of the first opportunities with funding to implement the water quality recommendations of the SCAP report (Matrix Design Group, 2013). The SCAP recommendations were used as the basis to develop a Proposed Action plan for drainage design and erosion control measures. Because the PPSL would be confined to eastbound improvements only, not all the SCAP recommendations could be implemented for this area.

The I-70 PPSL project is not within a high priority area identified in the SCAP. High priority areas are high in elevation or have steep roadway gradients. This project is lower in elevation and has relatively mild roadway grades. The application of highway traction sand is lower through the Empire Junction–Twin Tunnels area than in other high priority areas along I-70.

To refine the Best Management Practices (BMPs) that could be implemented with this project, detailed site mapping was used to perform hydrologic and hydraulic engineering evaluations to determine the project's potential effects on drainage and erosion. Several coordination meetings were conducted between members of the project design team and consultants who developed the SCAP for Clear Creek.

Existing water resource conditions were documented by field surveys of drainage features, sediment deposition, and erosion conditions and through review of water quality data for the study area. Examples of existing conditions are shown on Figure 1. Potential changes anticipated during and after construction were evaluated.

Potential mitigation strategies for water quality impacts resulting from the Proposed Action were evaluated based upon the SCAP recommendations. Water quality protection from erosion and sedimentation caused by highway runoff was considered in the project design. Selection of permanent water quality BMPs from SCAP recommendations considered the development and implementation of a routine maintenance plan.

Water quality is also adversely impacted in the corridor by trace metals from past mining operations. The PPSL project area does not include active mining areas; however, the project may encounter mine-related wastes during construction (Pinyon, 2013). If this occurs, impacts may be mitigated during construction as discussed in Section 5.4 of this technical memorandum and the Materials Management Plan.

Figure 1. Project Area Photos

Channel bank erosion in Clear Creek, Idaho Springs.

Example area where direct runoff from eastbound I-70 may flow directly into Clear Creek. (SH 103 off-ramp)

2.2 Study Area

The study area is defined as the portion of the PPSL project in which construction will occur. Construction of highway improvements will cover the ten-mile-long segment of I-70 from the US 40/I-70 interchange or Empire Junction (MP 232) to the Twin Tunnels (MP 242.2). Clear Creek is the primary water resource in the study area and generally flows immediately adjacent to I-70, receiving roadway runoff. Small, ephemeral drainages and larger perennial drainages generally flow under I-70 from north to south and into Clear Creek on the south side of I-70. Between central Idaho Springs and west of the Twin Tunnels, Clear Creek is along the north side of I-70.

This highway segment is characterized by a steep canyon environment with slopes at the angle of repose and near vertical rock outcrops in several areas. I-70 was constructed using cut-and-fill methods in most areas, with fill material placed on Clear Creek's bank. In many locations Clear Creek is constricted by the narrow canyon and further channelized by fill material from I-70 in many areas.

Eastbound highway runoff typically flows directly into Clear Creek. There are relatively few existing inlets and storm pipes that convey stormwater runoff from eastbound I-70 through this project reach.

The study area is within the area designated by the Environmental Protection Agency (EPA) as the Clear Creek/Central City Superfund Area, and includes several locations where Colorado Department of Public Health and Environment (CDPHE) has remediated mining-related drainages, mill sites, and mine waste piles (CDOT, 2011c). These locations are shown in the Regulated Materials and Solid Waste Technical Memorandum. Remediation sites adjacent to the south side of I-70 include:

- Between I-70 and Clear Creek, across from the County Maintenance facility and McClelland mine (as well as the tailings on the south side of Clear Creek)—MP 235.5
- Philadelphia mill at Spring Gulch (particularly east side of Spring Gulch Road)—MP 236.3
- Alma-Lincoln mine headframe area (west of Idaho Springs)—MP 238.5
- Big Five mill tailings (along Clear Creek at eastbound off-ramp to SH 103)—MP 239.4

In addition, the I-70 Mountain Corridor PEIS and Clear Creek County have identified numerous mill sites along I-70 that have not been remediated (CDOT, 2011c). These are also shown in the Regulated Materials and Solid Waste Technical Memorandum.

2.3 Data Sources

The following data sources were used in this evaluation:

- I-70 Mountain Corridor Programmatic Environmental Impact Statement (CDOT, 2011b)
- CDOT I-70 water quality monitoring program data
- CDOT winter maintenance material usage data
- Stream water quality regulation standards
- *I-70 Clear Creek SCAP* (Matrix Design Group, 2013)

2.4 Regulations

This section identifies the relevant federal and state regulations that apply to water quality. Under the federal Clean Water Act of 1977, as amended by the Water Quality Act of 1987, the Environmental Protection Agency (EPA) established a framework for protecting and improving the nation's water quality.

The CDPHE Water Quality Control Commission promulgates regulations specifying classifications and numeric water quality standards for Colorado by river basin. Clear Creek is in the South Platte River Basin. Water quality is regulated for the South Platte River Basin under Regulation No. 38 (CDPHE, 2013). The study area is located within Segments 2 and 11 of Clear Creek watershed.

This study area is outside the Municipal Separate Stormwater Sewer System (MS4) boundaries as defined by the 2000 census of urbanized areas.

Water Quality Stream Classifications, Standards, and Impaired Streams

The designated use classifications for Clear Creek in the study area are shown in Table 1. Numeric water quality standards apply for protection of the designated uses. Stream standards for chloride and trace metals are in effect for Segment 2.

Table 1. Clear Creek Stream Use Classifications

Stream Segment Description	Water Supply	Aquatic Life Cold 1	Recreation E	Agriculture
Clear Creek Silver Plume to Argo Tunnel (Seg.2a,b,c)	✓	✓	✓	✓
Clear Creek Argo Tunnel to Golden (Seg.11)	✓	✓	✓	✓

Source: CDPHE

CDOT conducted water quality monitoring of Clear Creek and highway runoff from 2000 to 2009, the results of which are summarized in Table 2. Where applicable, the I-70 stream water quality monitoring results are compared to water quality standards to assess water quality exceedances. This comparison is also provided in Table 2.

Table 2. Clear Creek Storm Event/Snowmelt Mean Concentrations (mg/L) I-70 Mountain Corridor—2000 to 2009

Stream Segment	Number of Samples	Suspended Solids	Phosphorus Total	Chloride	Sodium Diss.	Magnesium Diss.	Hardness as CaCO3	Cadmium Diss.	Copper Diss.	Manganese Diss.	Zinc Diss.
Standard*				***230***				***0.0015***	***0.008***	***0.050***	***0.353***
Clear Creek CC-2** (Seg.2a)	28-38	10	0.03	11.2	6.2	5.1	58	0.0008	0.003	0.008	0.080
Standard*				***230***				***0.0014***	***0.017***	***0.050***	***0.229***
Clear Creek CC-3** (Seg.11)	25-32	221	0.33	9.2	12.2	4.7	65	NA	0.006	0.221	0.120
Clear Creek CC-4** (Seg.11)	33-52	264	0.44	9.3	12.6	4.5	61	0.0011	0.006	0.154	0.097
I-70 Highway Runoff	65-72	953	0.87	137	71	16.1		NA	0.012	0.50	0.16

Source: Matrix Design Group

*Standards effective June 30, 2011. Trace metal standards based on average 61 mg/L hardness for Clear Creek; acute standards except chronic cadmium

**Data from 2000-2005—no event samples collected after 2005; ambient cadmium data taken from UCCWA database

The study area falls within Clear Creek Segments 2 and 11, which have been impacted by metals from historic mining near the project area. Segments 2a, 2b, 2c, and 11 are listed as impaired for cadmium; segment 2b is also listed as impaired for zinc (CDPHE, 2012).

2.5 Agency Coordination Conducted

As part of the PEIS, CDOT convened the SWEEP Committee whose shared objective is to improve stream and wetland conditions in the I-70 Mountain Corridor. This advisory committee consisted of fishery biologists, hydrologists and other watershed and water quality-related technical experts, community representatives and other potentially affected parties.

The SWEEP Committee identified environmental impacts that might occur as a result of highway expansion in the I-70 Mountain Corridor. Recommended mitigation strategies were presented in the SWEEP "Implementation Matrix" as part of the I-70 Mountain Corridor PEIS, as well as the January 4, 2011 Memorandum of Understanding (MOU) among the SWEEP Committee members (CDOT et al., 2011). The SWEEP MOU recommended developing a SCAP for the Clear Creek Watershed.

The I-70 Clear Creek SCAP, which is the basis for the water quality improvements for the study area, applied the Context Sensitive Solutions (CSS) approach developed for the I-70 Mountain Corridor PEIS. The project followed CSS principles regarding stakeholder involvement and the 6-step decision-making process.

Development of the SCAP included six stakeholder meetings between October 2010 and March 2013. Stakeholders included local, state, and federal agencies, and nongovernmental organizations. While not a direct result of the Proposed Action, input from these meetings were incorporated in the SCAP, and therefore present in the mitigation strategies associated with the Proposed Action.

Section 3. Description of the Proposed Action

The purpose of the I-70 PPSL project is to provide short-term eastbound operational improvements to relieve traffic congestion during periods when traffic volumes are highest. This segment is the most congested stretch of the entire I-70 Mountain Corridor. During both the summer and winter peak season, traffic volumes are highest on weekends when recreational travelers comprise more than 90 percent of traffic. In 2010 drivers experienced speeds of less than 20 miles per hour for 35 percent of the time on Sundays, which have the highest volume. Some motorists divert to the frontage road along I-70, which affects its ability to function as a local access county road.

The Proposed Action would add a peak period shoulder lane between the US 40/I-70 interchange and east Idaho Springs. This managed lane would be used during peak periods, defined as Saturdays, Sundays, and holidays, improving travel times and operations. The project extends from milepost 230 to milepost 243, with improvements proposed as follows:

- Milepost 230 to milepost 232: signage improvements only. Signage would notify motorists of the status of the managed lane, entrance and exit points, and cost.
- Milepost 232 to milepost 242: roadway improvements, including: up to 3.5 feet of widening in select areas to accommodate the managed lane, up to 14 feet of widening at the SH 103 on ramp and 4 feet to 8 feet of widening at all other on-ramps in the corridor, replacement of the existing SH 103 bridge, bridge replacement and interchange improvements at Exit 241,

improvements to Water Wheel Park, signage, rock fall mitigation in two locations, and construction of 11 retaining walls.

- Milepost 242 to milepost 243: signage improvements only.

The managed lane, which would be tolled, would operate up to, but not exceed, 20 percent of the annual days or 7.5 percent of the time, and connect to the three-lane section provided by the Twin Tunnels project, east of Idaho Springs, thereby capitalizing on that investment.

The improvements will be consistent with the *I-70 Mountain Corridor Programmatic Environmental Impact Statement* (PEIS) *Record of Decision* (ROD), I-70 Mountain Corridor Context Sensitive Solutions process, and other commitments of the PEIS. The Proposed Action fits within the definition of “expanded use of existing transportation infrastructure in and adjacent to the corridor” as an element of the Preferred Alternative Minimum Program.

See Figure 2 for an overview of the proposed improvements.

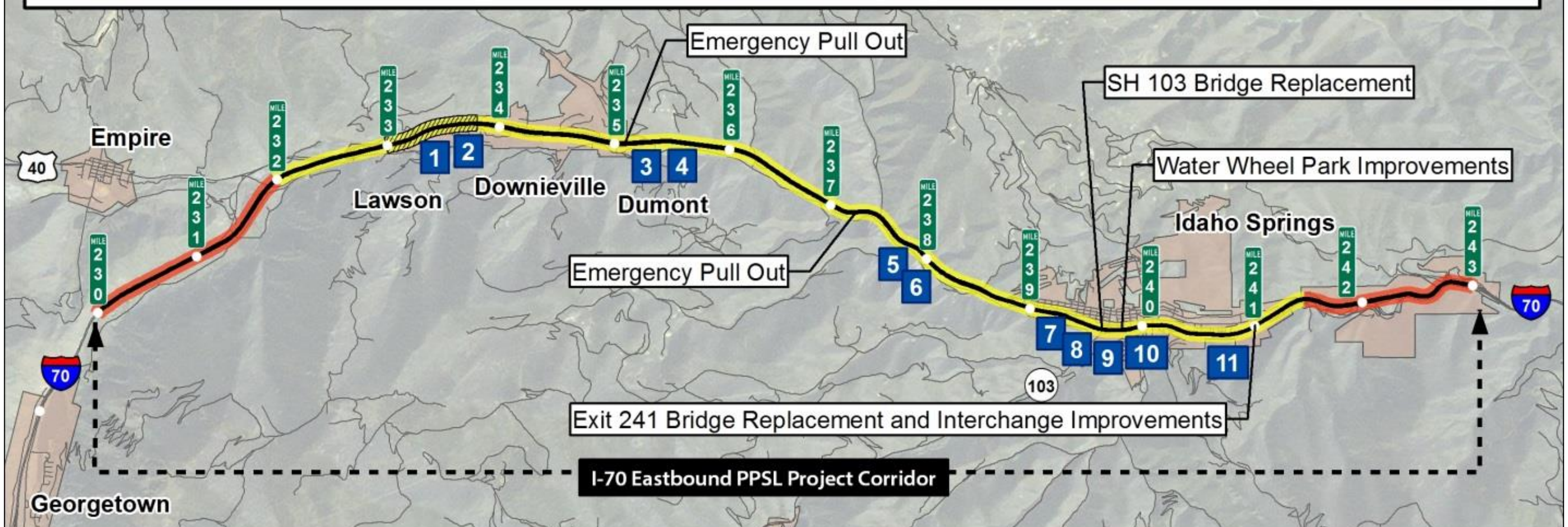
Figure 2. Proposed Improvements

Proposed Improvements

- Widening to accommodate a peak period shoulder lane.
- SH 103 bridge replacement and the Exit 241 bridge replacement and interchange improvements, including a new retaining wall.
- Construction of 10 retaining walls and rehabilitation of an existing retaining wall.
- Construction of 2 emergency pull outs.
- Signage throughout the corridor.
- Up to 14 feet of widening at the SH 103 on-ramp and approximately 4-8 feet of widening at all other on-ramps.
- Improvements to Water Wheel Park.
- Water quality treatment measures throughout the corridor.
- Two areas of rock fall mitigation near milepost 240.

Retaining Wall Summary

	Wall Location Description	Mainline or Ramp Widening	Length Wall (Feet)	Maximum Exposed Wall Height (Feet)
1	Lawson	Mainline	750	4.3
2	East of Lawson	Mainline	375	2.4
3	Dumont On-Ramp	Ramp	275	2.6
4	Between Dumont and Fall River	Mainline	875	2.6
5	Fall River On-Ramp Wall #1	Ramp	325	3.4
6	Fall River On-Ramp Wall #2	Ramp	325	2.9
7	SH 103 Off-Ramp	Ramp	210	5.8
8	SH 103 Off-Ramp (existing wall to be rehabilitated)	Ramp	400	Existing
9	SH 103 On-Ramp	Ramp	TBD	4.0
10	Approach to Bridge over Clear Creek	Ramp	75	2.0
11	Exit 241 Ramp (walls on both sides)	Ramp	500	12.0
			4,110	N/A



- PPSL Project Corridor
- Signage Only
- Roadway Improvements (Minimal to No Mainline Widening)
- Roadway Improvements (Widening of 3 to 3.5 Feet)
- X Retaining Wall Location

N

0 0.75 1.5 3 Miles

I-70 EASTBOUND PEAK PERIOD SHOULDER LANE

Date: 3/31/2014

Data Source: Clear Creek County,CDOT, HDR Note: TBD=To Be Determined N/A=Not Applicable

Section 4. What Are the Current and Future Conditions of Water Quality in the Study Area?

4.1 Current Conditions

Climate and Hydrology

Elevation in the study area ranges from approximately 8,200 feet to 7,400 feet. Climate is a major factor with respect to the operation and maintenance of I-70 within the corridor during the winter months, when ice and snow accumulations are significant.

The study area has mean temperatures with below freezing conditions in winter (December to March). The average annual temperature and precipitation in the study area are 43° F and 14 inches, respectively, measured at Idaho Springs. Figure 3 and Figure 4 show seasonal temperature and precipitation distribution for the town of Idaho Springs.

Elevation and season determine the form and temporal distribution of precipitation. Precipitation is dominated by rainfall during the summer and snowfall during winter. Precipitation amounts are low to moderate during winter and spring, higher during the summer monsoon period (July through August), and low in fall and early winter. Snow accumulation in the study area is less than at the higher elevations of the I-70 corridor.

The seasonal precipitation pattern determines highway runoff and stream flow conditions in the study area. Other factors that can influence hydrology include transmountain water diversions, storage reservoirs, and increases in impervious surfaces resulting from urban, commercial, industrial, and highway development.

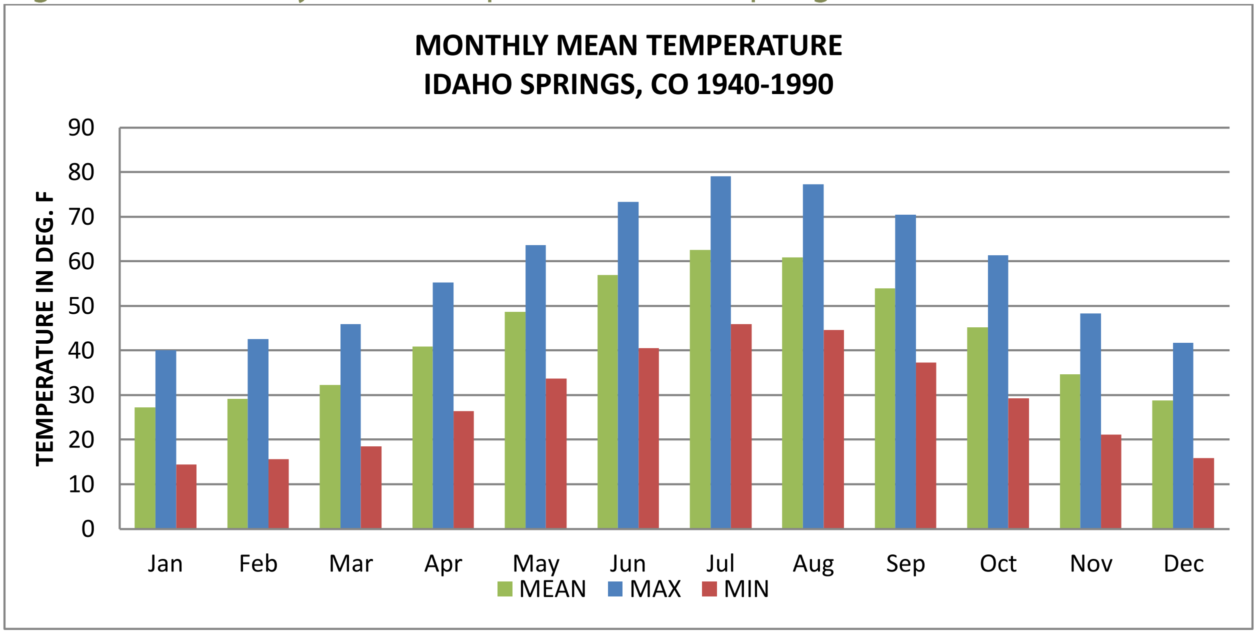
Figure 5 shows the streamflow hydrograph for seasonal flow by water year (October 1 to September 30) in Clear Creek east of Idaho Springs above Johnson Gulch, corresponding to approximately MP 244 on I-70. Spring snowmelt generates peak flows in May and June. Streamflow generally recedes over the summer and fall, with increases resulting from rainfall-runoff events. Clear Creek's minimum flows occur during the fall and winter, and peak flows in spring result from snowmelt runoff.

Water Quality

CDOT is conducting an ongoing monitoring study of the effects of I-70 on receiving stream water quality in the mountain corridor. Four separate reports (*Data Evaluation Report*, *Interstate 70 Mountain Corridor Storm Event/Snowmelt Water Quality Monitoring*) have been issued by CDOT covering the period 2000–2009 (CDOT, 2011a). These reports provide the basis for documenting and monitoring water quality conditions in the study area.

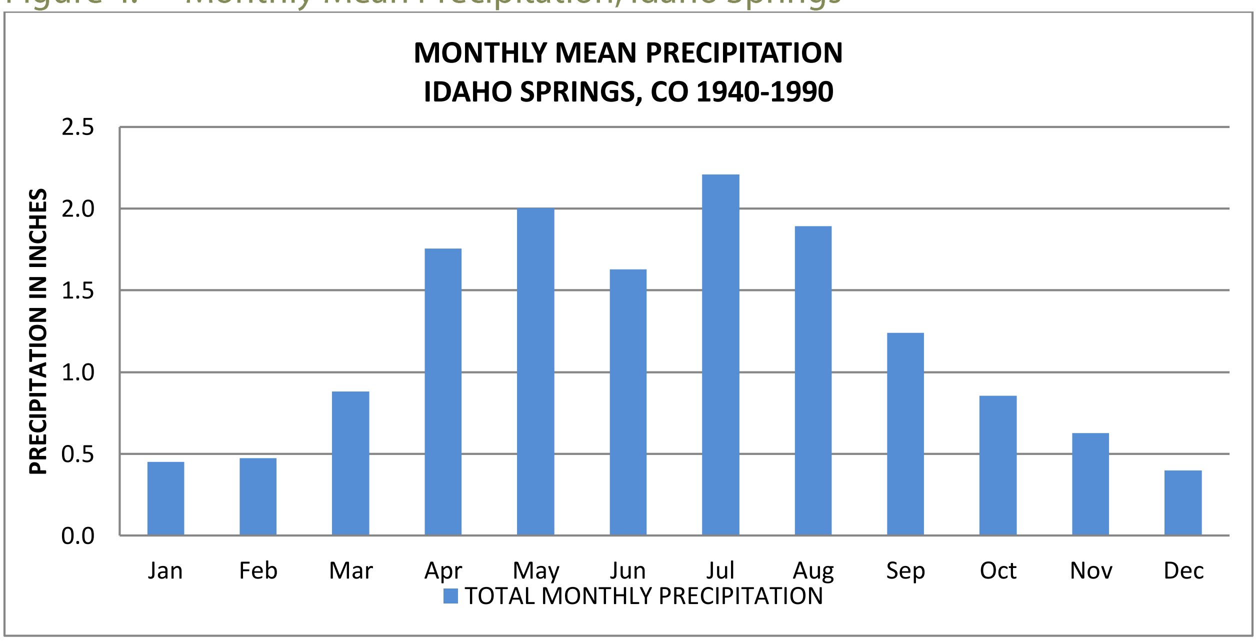
Stream water quality can be affected by highway winter maintenance material (sand and salt) that run off the highway into receiving streams. The amount and type of winter maintenance material used changes based on weather conditions and mobility demands of the traveling public. The I-70 Mountain Corridor PEIS identified <u>sediment</u> and <u>chloride</u> as the primary water quality parameters of concern for the I-70 corridor in the study area (CDOT, 2011b).

Figure 3. Monthly Mean Temperature, Idaho Springs



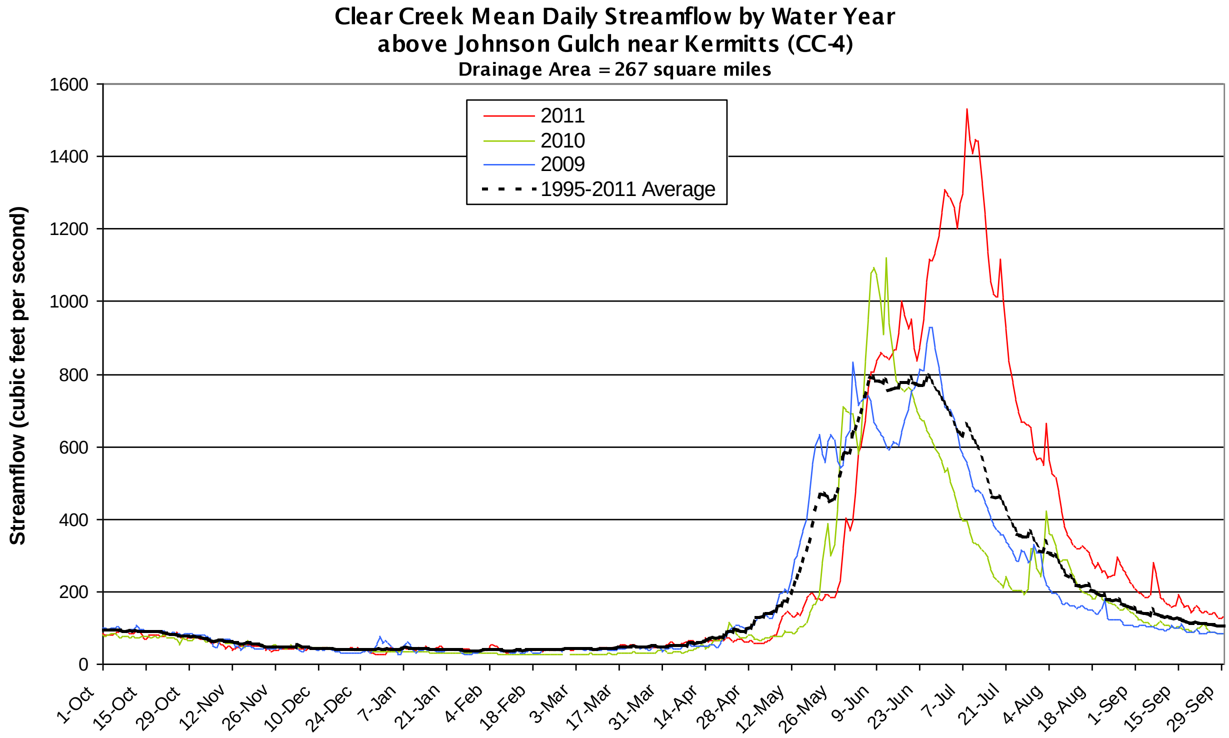
Source: Matrix Design Group
Note: Data for temperature and precipitation in Idaho Springs are available up to 1990 through the National Ocean and Atmospheric Administration and Western Regional Climate Center.

Figure 4. Monthly Mean Precipitation, Idaho Springs



Source: Matrix Design Group
Note: Data for temperature and precipitation in Idaho Springs are available up to 1990 through the National Ocean and Atmospheric Administration and Western Regional Climate Center.

Figure 5. Clear Creek Mean Daily Discharge by Water Year



Source: Matrix Design Group

CDOT Winter Maintenance

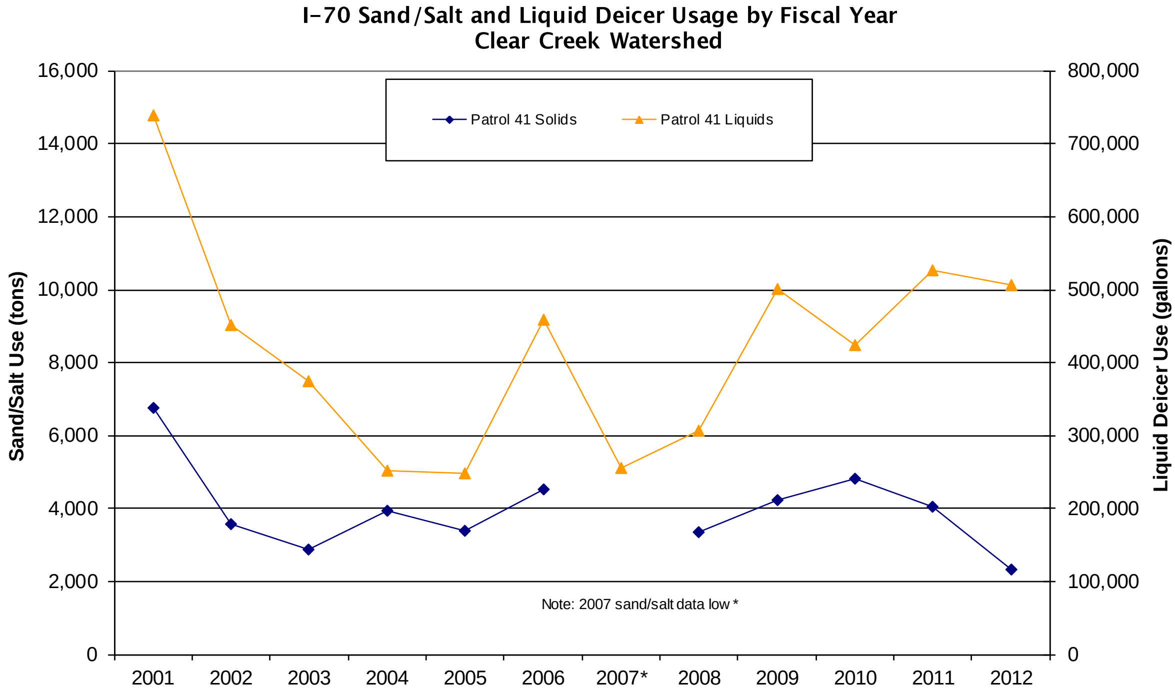
The highway contributes surface runoff to receiving streams during snowmelt or rainfall runoff conditions. CDOT removes snow from the travel lanes and applies traction sand or salt-based liquid deicers to maintain winter mobility. Traction sand accumulates along the highway shoulders over the winter in the study area. Snowmelt and rainfall runoff can remobilize dissolved and particulate contaminants from I-70 to receiving streams.

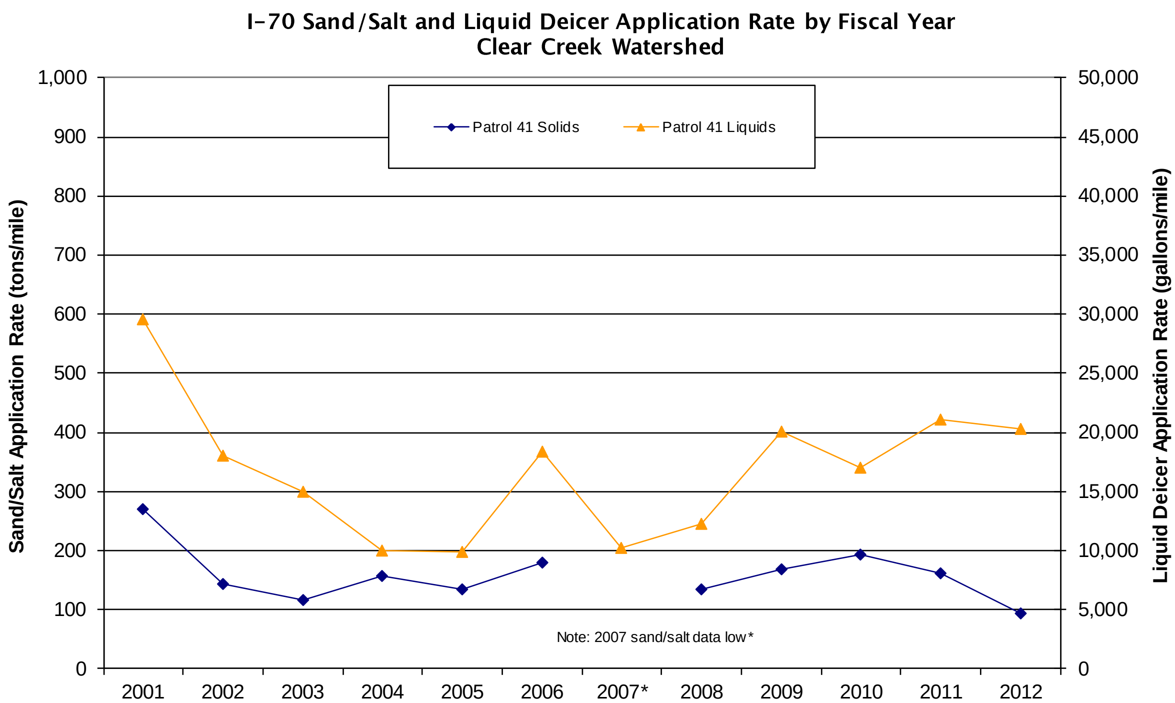
The winter maintenance material usage data for I-70 is compiled by CDOT according to maintenance patrol. The study area falls within CDOT Patrol 41, which extends from the Eisenhower Tunnel to Idaho Springs. Figure 6 shows the use of solid and liquid deicers along Patrol 41 from 2000 to 2012 (Matrix Design Group, 2013). Solids use along Patrol 41 has remained relatively consistent since 2000, while the use of liquid deicer has increased since 2007. Such trends reduce the amount of sand entering receiving streams, but increase the salinity of streams during the first flush of spring runoff.

Highway Stormwater Runoff

Rainstorm activity during the summer monsoon period can cause relatively high-energy runoff and erosion/transport of material from I-70 to receiving streams. This results in mobilization of both dissolved and particulate material from the roadway, as well as erosion of unconsolidated traction sand and soil. Water quality in receiving streams can change dramatically under these conditions.

Figure 6. I-70 Sand/ Salt and Liquid Deicer Use





Source: Matrix Design Group
*Year 2007 solid volumes not used; possible under-reporting caused by CDOT transition from Maintenance Management System to the SAP

Sediment transport from the highway is relatively low during the early snowmelt period because the flow energy is typically not great enough to cause erosion and transport large quantities of sediment downstream through the system (CDOT, 2011a). Instead, material is deposited at the bottom of slopes and in the stream channel where gradients (and velocity) are too low for further transport. Higher stream sediment transport rates occur during basin-wide snowmelt flows in the spring (May through June) and during summer rainstorms (Matrix Design Group, 2013). During these periods the energy condition (velocity) is high enough to erode material from highway sources and transport in-stream deposits downstream through the system.

4.2 Future Conditions

Since Clear Creek will continue to be a drinking water supply for more than 300,000 residents in the Denver metropolitan area, water quality protection will remain a high priority. New regulations aimed at protecting water quality will result in more stringent standards in the future. Clear Creek water quality is threatened by a number of conditions including erosion from historic mines, mine drainage, runoff from urban development, population growth, local roadway runoff, and I-70 runoff.

Section 5. What Are the Environmental Consequences?

5.1 How Does the No Action Alternative Affect Water Quality?

As previously discussed, runoff from I-70 has the potential to increase sediment, nutrient, and chloride concentrations in Clear Creek. Accidental spills that occur along the highway each year also affect water quality and threaten downstream water suppliers. Additional residential, commercial, and industrial development within the Clear Creek watershed may increase impervious surface and stormwater runoff, which can impact water quality.

The emphasis on using deicer salts to maintain safe winter mobility is likely to continue. Salt inputs into Clear Creek will vary from year to year depending on winter maintenance and climatic conditions, but the trend towards higher stream chloride concentrations is likely to continue even under the No Action alternative. Also, without a CDOT project that can implement portions of the Sediment Action Plan (SCAP), traction sand will continue to be conveyed directly into Clear Creek.

5.2 How Does the Proposed Action Affect Water Quality?

Direct impacts on water resources related to the Proposed Action include minor increases in impervious surface area/roadbed expansion. The anticipated increase in additional impervious surface is 1.5 acre, which is an increase of approximately 3 percent of the eastbound roadway surface within the project area. The Proposed Action will create new construction disturbances, minor reshaping of the low flow channel near the retaining wall west of SH 103, and potential impacts from disturbance of historic mine waste materials. Changes in impervious surface and roadbed expansion are permanent impacts, whereas construction impacts are temporary.

Increased impervious surface will increase runoff and affect stream water quality. However, this impact will be minor as widening has been limited to 1 foot to 4 feet at various segments through the project area. One encroachment into Clear Creek upstream of SH 103 is anticipated where a retaining wall will be widened into the floodway in order to stabilize an existing deteriorated retaining wall.

The *I-70 PEIS Direct Impact Analysis* (Clear Creek Consultants, 2010) presents estimated changes in corridor stream loading for each alternative presented in the PEIS. The analysis estimates stream loading for suspended solids, phosphorus, chloride, copper, and zinc as a percentage increase from existing I-70 conditions. The direct impact analysis estimated a 10 percent increase in concentration of these water quality constituents as a result of the six-lane widening alternative (assuming no mitigation).

The Proposed Action primarily includes minor increases in the impervious surface area of the eastbound direction of the highway, for which minor increases in winter maintenance materials usage are expected. The Proposed Action will increase impervious surface of 1 foot to 4 feet, while the *I-70 Mountain Corridor PEIS* analyzed an increase in impervious surface for an additional two lanes of widening (approximately 24 feet). Therefore, potential water quality changes as a result of the Proposed Action would be less than those predicted in the I-70 Mountain Corridor PEIS for Clear Creek in the study area.

Although increases in stormwater runoff and related pollutants are possible, permanent sediment control BMP structures planned as part of the Proposed Action will treat more impervious roadway area than is being added by the project. Proposed BMPs include sedimentation ponds and sediment trap inlets to treat runoff; BMPs will incorporate rundowns or culverts to convey treated runoff to Clear Creek. The proposed BMP structures are expected to remove significant amounts of sediment and could result in no adverse impact to water quality as a result of the Proposed Action. A summary of proposed BMP impacts is provided in Table 3, and a summary of proposed BMPs is provided in Table 4.

Table 3. Summary of Proposed BMP Impacts

Project Impervious Area Treatment	
A. Existing impervious area within Project Limits	54.1 Acres
B. New impervious area within Project Limits	1.5 Acres
C. Impervious area being treated by proposed BMPs	12.7 Acres
D. Additional impervious area treated by Project	11.2 Acres
E. Impervious area treated within Project Limits	23%

Although the PPSL would expand the asphalt surface by 1.5 acre (3 percent increase), the project is anticipated to construct BMPs that treat approximately 23 percent of the eastbound roadway.

5.3 What Indirect Effects Are Anticipated?

Indirect impacts include the potential disturbance of mine tailings and a very minor increase in usage of winter maintenance materials. During heavy snowfall events the decreased shoulder width would result in snow, and any winter maintenance materials it contains, being “thrown” beyond the edge of the pavement. These materials could enter Clear Creek.

The Proposed Action is not expected to induce development or changes in land use that would impact water quality in Clear Creek within the study area.

5.4 What Effects Occur During Construction?

Impacts to water quality could occur if construction exposes mine tailings. Exposed mine tailings, containing high levels of arsenic, lead, and cadmium, can result in these compounds being transported into Clear Creek and degrading its water quality. A field trip with CDPHE personnel located areas where mining mill sites have been remediated within the study area (see Section 2.2 of this technical memorandum and the *Regulated Materials and Solid Waste Technical Memorandum*). Construction activities planned along the SH 103 retaining wall may encounter the remediated Big Five Waste Rockpile. CDPHE prefers that, if any remediated sites are excavated, the material be encapsulated and covered on-site, rather than taken to the existing mine waste repository in Gilpin County (Doug Jamison and Steve Laudeman, CDPHE, personal communication, October 17, 2013). The Materials Management Manual to be prepared for this project will discuss identification of mineralized material and related handling methods. Material that cannot be encapsulated on site will be transported to the Superfund Repository in Gilpin County.

Disturbance and erosion of underlying soil, stockpiles, and access roads during construction can contribute to water quality degradation in Clear Creek. Vehicle tracking can carry loose sediment onto the roadway which can be transported into Clear Creek. Concrete wash-out has the potential to be conveyed into the drainageways. Accidental spills from machinery, drilling activities, and storage tanks can affect water quality during construction. Soil disturbed during construction can lead to long-term erosion and sedimentation in Clear Creek if not mitigated.

A Stormwater Management Plan (SWMP) is being developed for the PPSL project to address construction activities. A Construction Activities Stormwater Discharge Permit will be obtained from CDPHE for compliance with stormwater management during construction. The SWMP typically includes silt fence to act as a barrier to sediment migration, sedimentation basins to capture sediment-laden runoff, vehicle tracking pads to contain mud on construction equipment, designated concrete wash-out basins to capture discharges from concrete trucks, soil stabilization through revegetation, and good house-keeping practices to contain potential pollutants. The SWMP is designed to mitigate potential water quality impacts during construction.

5.5 What Effects Occur Post-Construction?

The Proposed Action would construct sedimentation basins and inlet sediment traps throughout the PPSL corridor to capture traction sand and other highway runoff pollutants. These water quality facilities are BMPs as proposed in the SCAP. A total of 7 sedimentation basins and 9 underground inlet vaults are proposed for the PPSL project. These 16 facilities would treat approximately 23 percent of the runoff from the eastbound roadway through the project area. Table 4 summarizes these facilities and the tributary area that they treat. The treated area is much greater than the additional impervious area constructed with this project and, therefore, water quality is expected to be the same or better following construction of the PPSL.

Table 4. Summary of Proposed BMPs

Feature Type	MP	Location Description	Area Draining to BMP (Acres)	Percent Impervious Area in Basin Treated	Impervious Area Draining to BMP (Acres)	BMP Capacity for Sediment (CY)	Est. Annual Sand Volume (CY)	2-year. Storm Runoff Volume (CF)	Estimated Maintenance Cycle (years)
Sed. Basins	231.8	West of Empire Junction	5.1	24%	1.3	79.0	33.6	1,786	2.4
	232.3	Adjacent to EB I-70 on-ramp	74.6	1%	0.6	31.7	15.2	5,184	2.1
	233.1	Lawson—EB I-70 off-ramp	0.8	100%	0.8	40.1	20.8	1,568	1.9
	233.5	Lawson—RD 308	0.6	100%	0.6	38.8	16.0	1,220	2.4
	234.9	Dumont	0.2	100%	0.2	27.3	6.4	479	4.3
	239.6	SH 103 off-ramp	1.8	100%	1.8	45.4	47.2	3,659	1.0
	241.0	At Shelly/ Quinn Fields	2.9	44%	1.3	53.5	34.4	1,829	1.6
Inlet Sed. Traps	233.6	East Lawson retaining wall	0.3	100%	0.3	9.7	8.0	610	1.2
	234.2	Median near Downieville	1.0	87%	0.8	9.7	22.4	1,481	0.4
	235.1	Median near Dumont—EB I-70 on-ramp	1.4	69%	0.9	9.7	25.6	1,394	0.4
	235.2	East Dumont Retaining Wall	0.3	100%	0.3	9.7	8.0	566	1.2
	253.6	Retaining Wall between Dumont and Fall River	0.8	100%	0.8	9.7	20.8	1,612	0.5
	238.0	Retaining Walls at Fall River on-ramp	0.8	100%	0.8	9.7	21.6	1,655	0.4
	238.3	Median between Fall River and SH 103	2.0	70%	1.4	9.7	37.6	2,091	0.3
	238.5	Median between Fall River and SH 103	1.2	52%	0.6	9.7	16.8	871	0.6
	239.9	Retaining Wall at I-70 over Clear Creek	0.3	100%	0.3	9.7	8.8	653	1.1
		Total	***93.9***		***12.7***	***403.1***	***343.2***	***26,658***	

Section 6. What Mitigation Is Needed?

Table 5 details the mitigation measures for water quality resource impacts.

Table 5. Mitigation Measures

Activity	Location	Impact	Mitigation
Runoff from roadway during operation	Throughout the PPSL study area	Impacts to water resources and aquatic resources as a result of water quality degradation due to contaminant runoff.	CDOT will implement several of the measures identified in the Sediment Control Action Plan, which allows for flexibility in the number, sizing, type, and locations of BMP structures, while controlling drainage entering Clear Creek. BMPs will include sedimentation ponds, sediment trap inlets, rundowns and slope erosion control measures. Seven sedimentation basins and nine inlet traps have been proposed. These concepts will be further refined during final design.
Runoff from roadway during operation	Throughout the PPSL study area	Impacts to water resources as a result of water quality degradation due to contaminant runoff.	Hazardous spill containment structure locations will be included at the emergency pull outs.
Runoff from construction	Throughout the PPSL study area	Impacts to water resources and aquatic resources as a result of water quality degradation.	CDOT will implement appropriate BMPs for erosion and sediment control according to the CDOT Erosion Control and Storm Water Quality Guide (CDOT 2002), develop a Stormwater Management Plan (SWMP), which includes mitigation identified in the Upper Clear Creek Sediment Control Action Plan.
Construction staging areas	Throughout the PPSL study area	Direct and/or indirect impacts to water resources, aquatic resources, wetlands and waters of the United States.	Construction staging and materials stockpiling will be located greater than 50 feet from the edge of wetlands or the edge of other waters of the U.S., when possible, to avoid disturbance of vegetation and to prevent pollutant discharges into sensitive habitats. If this buffer is not achievable, CDOT will consider the placement of materials closer to the edge of wetlands or the edge of water and identify appropriate additional best management practices (BMPs) that would be required to minimize.
Long-term erosion impacts from soil disturbance that occurred during construction	Throughout the PPSL study area	Erosion, leading to increased sedimentation.	CDOT will achieve permanent stabilization through revegetation and permanent erosion controls and through maintenance of temporary erosion controls and plantings to stabilize disturbed areas.

Section 7. References

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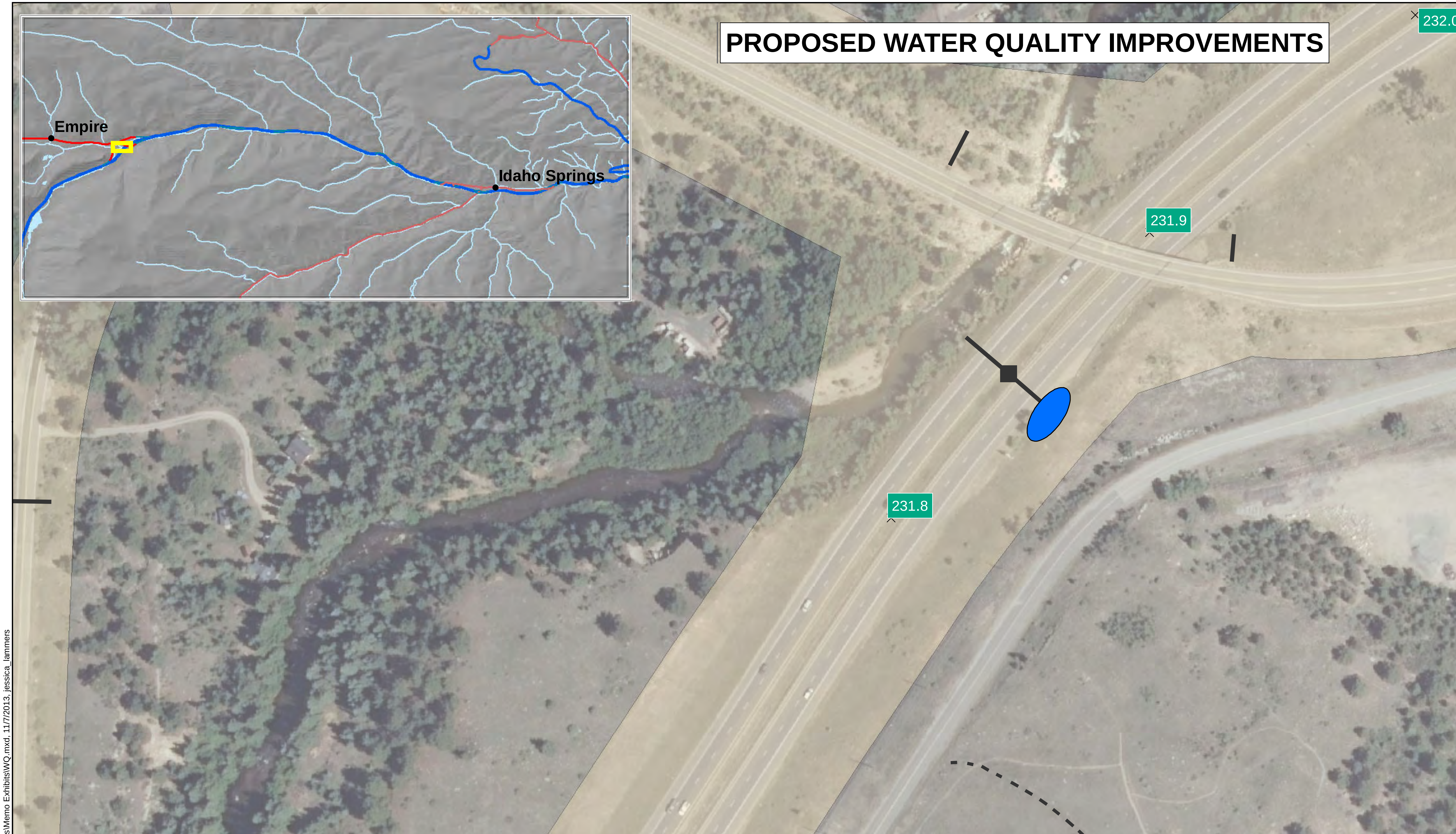
Appendix A.
Maps of Proposed Water Quality Improvements



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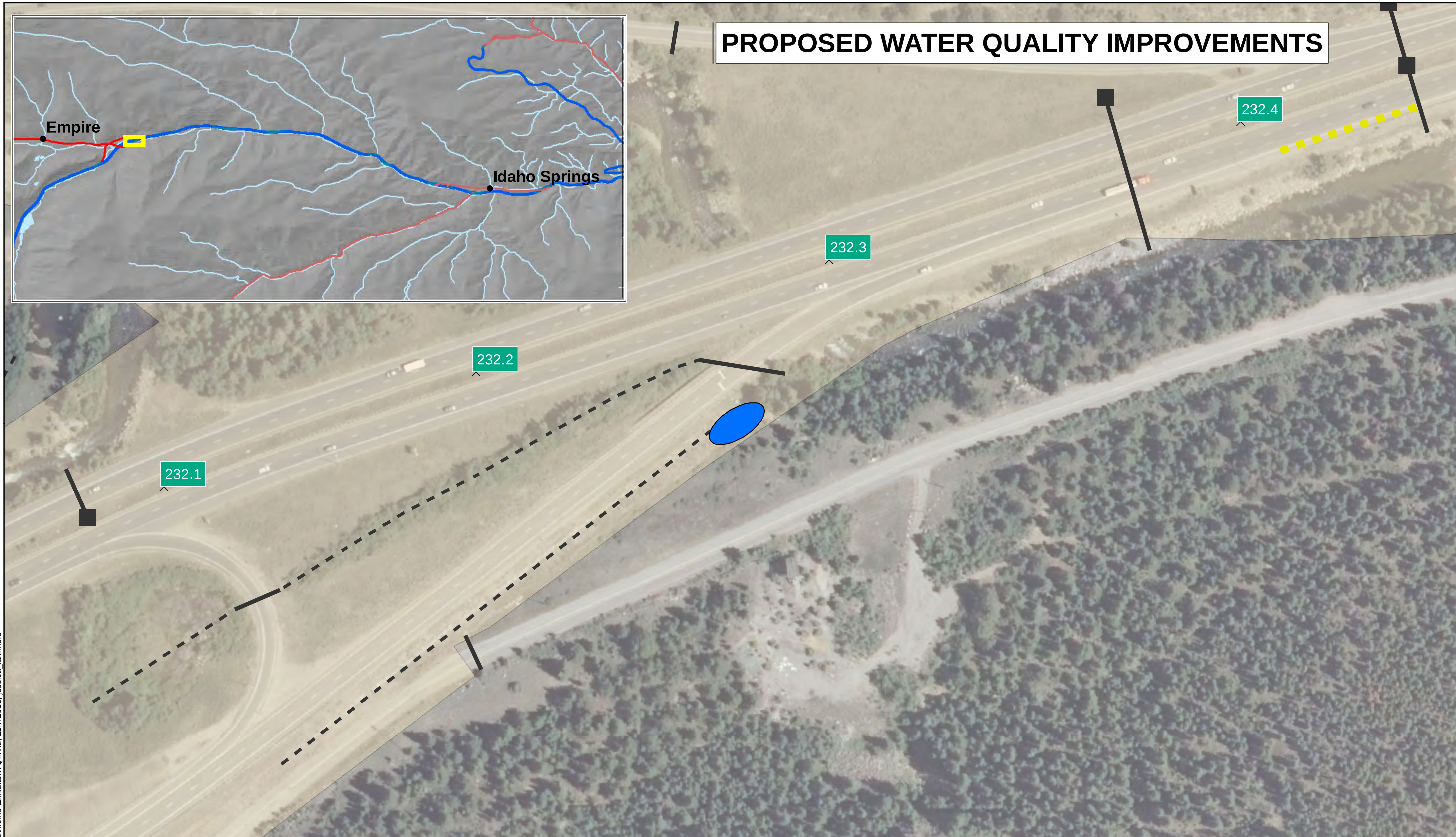
I-70 EASTBOUND PEAK PERIOD SHOULDER LANE

Date: November 7, 2013

Data Source: CDOT, DRCOG

FILE: G:\gis_projects\CDOT_PPSL\active\apps\Memo Exhibits\WQ.mxd, 11/7/2013, jessica_lammers

PROPOSED WATER QUALITY IMPROVEMENTS



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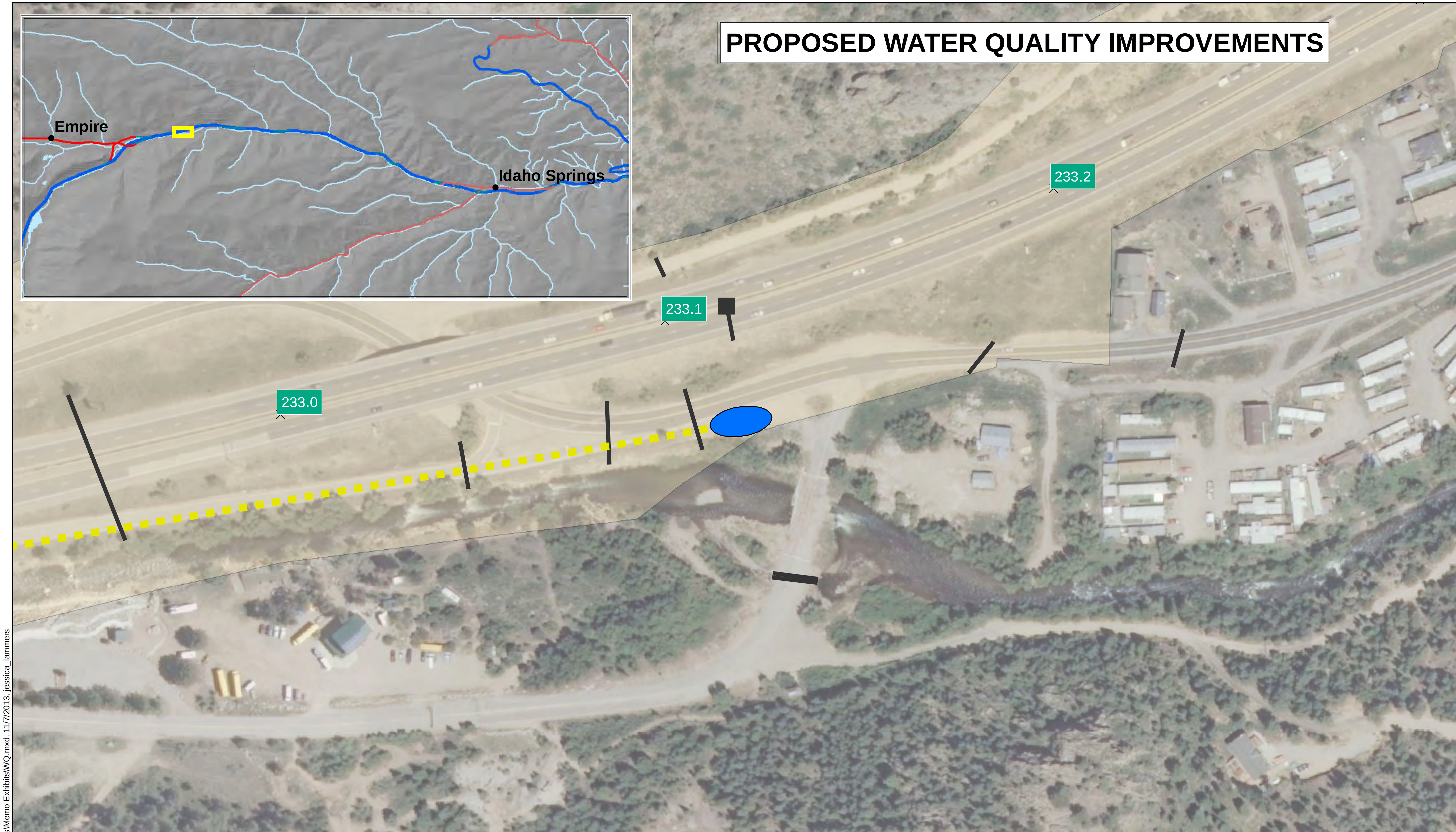

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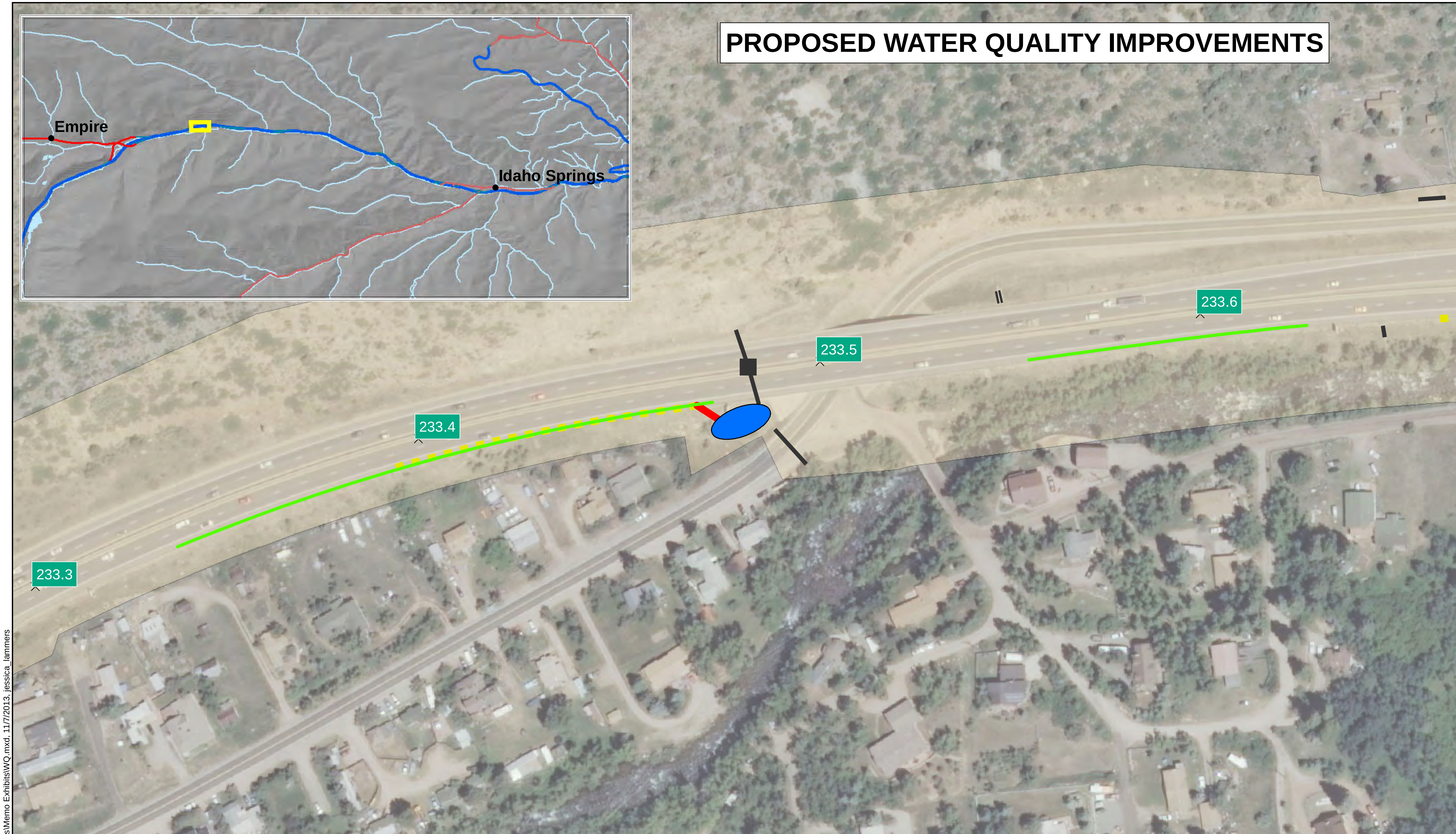

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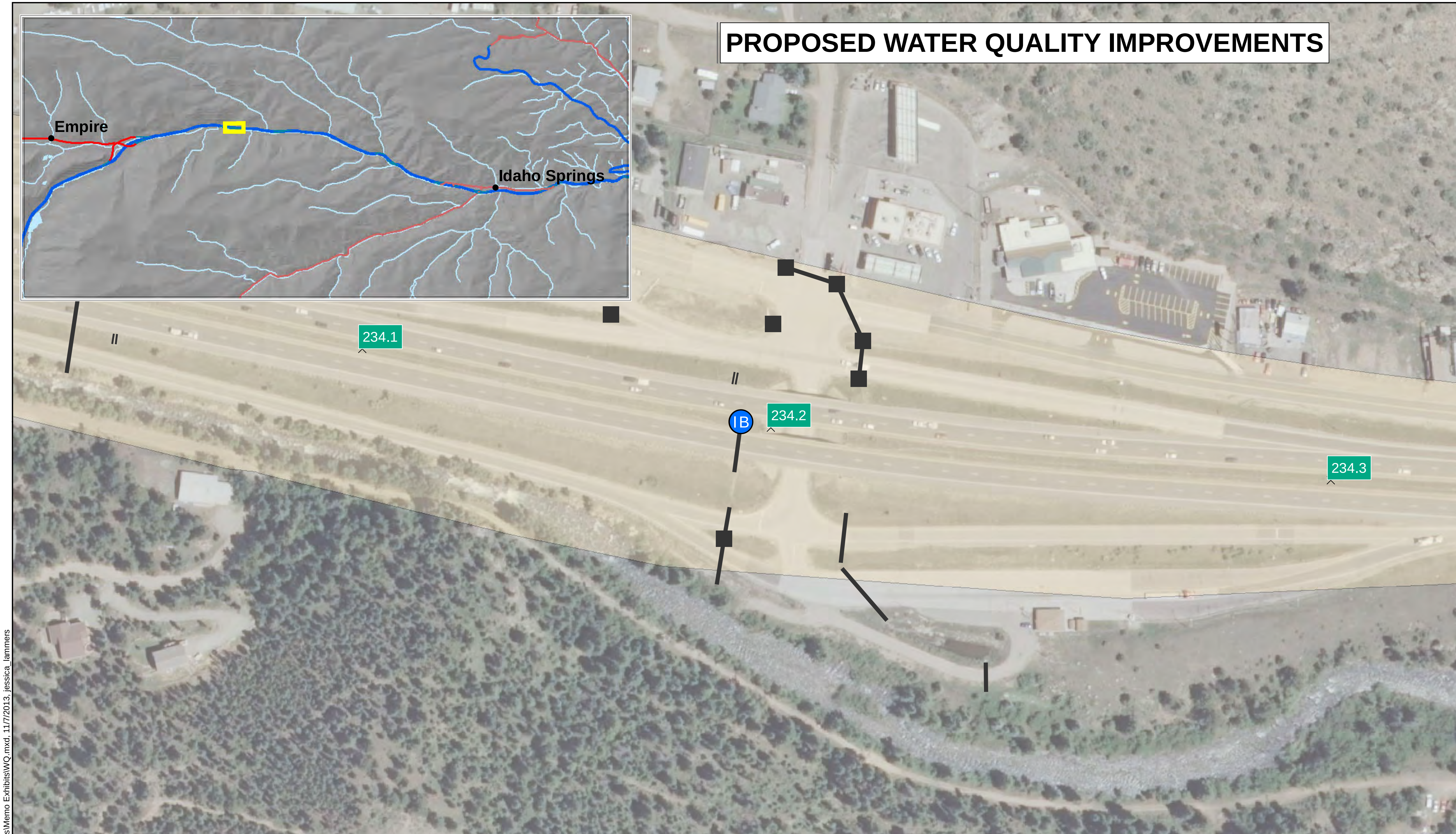

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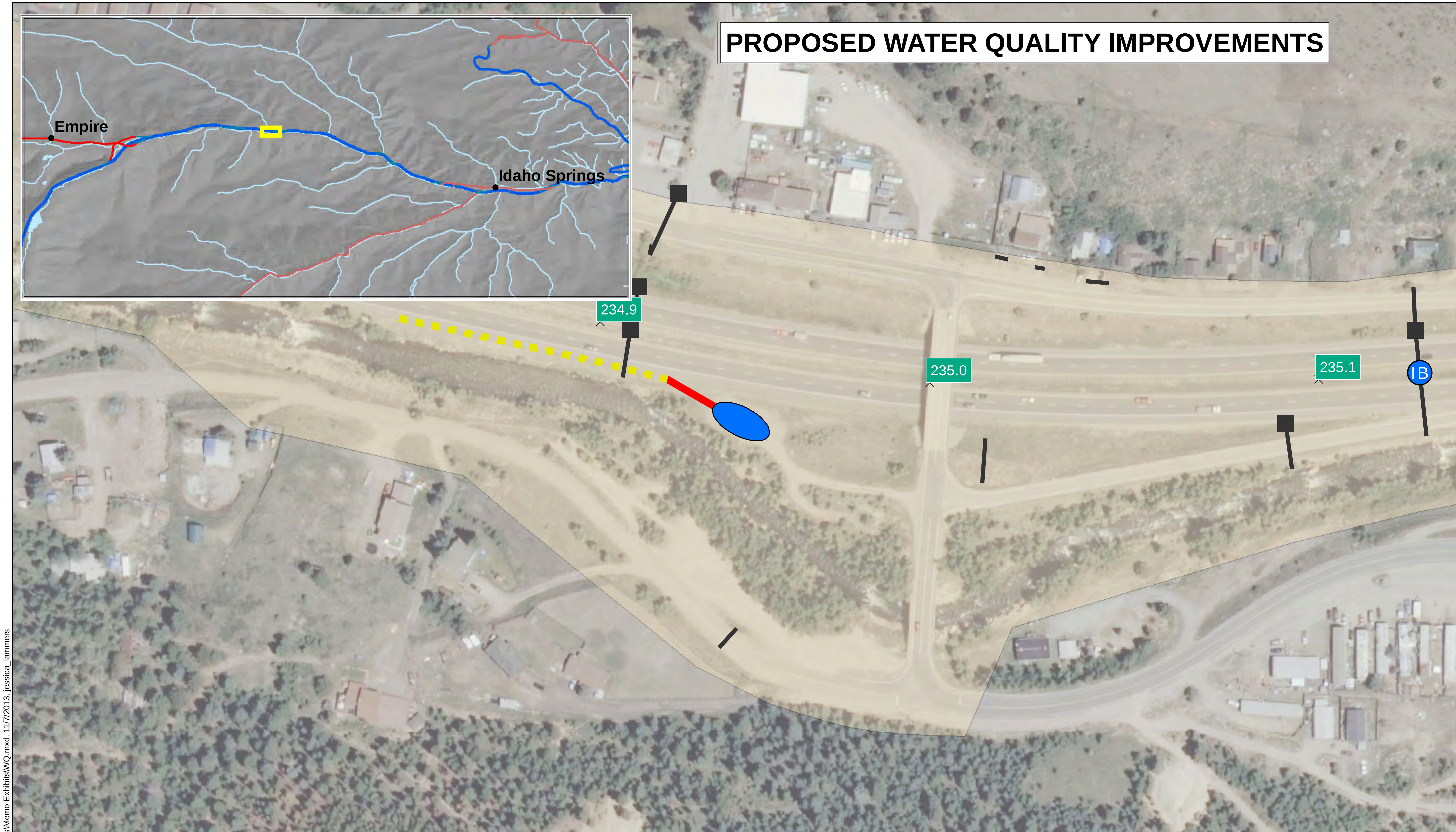

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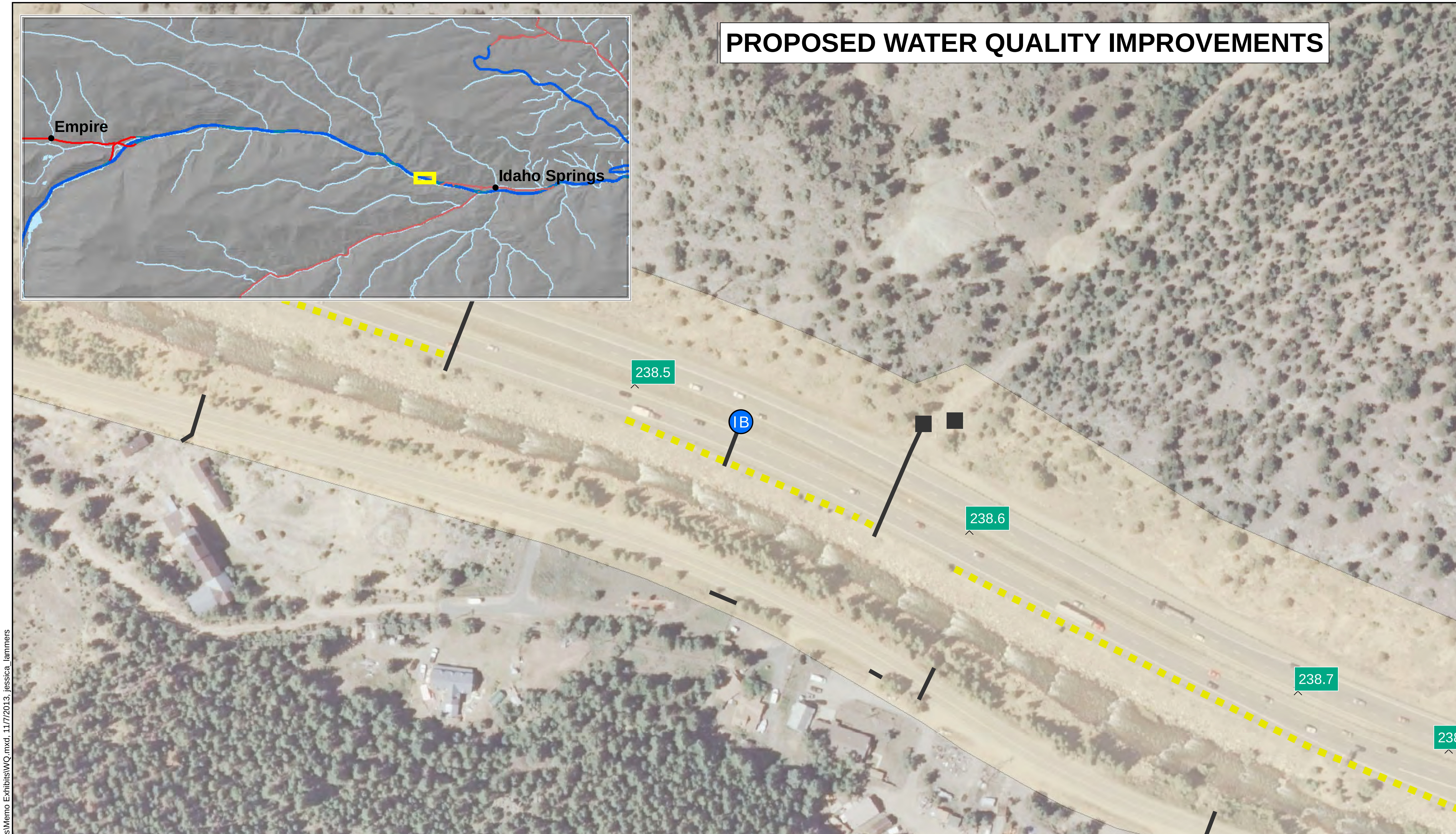

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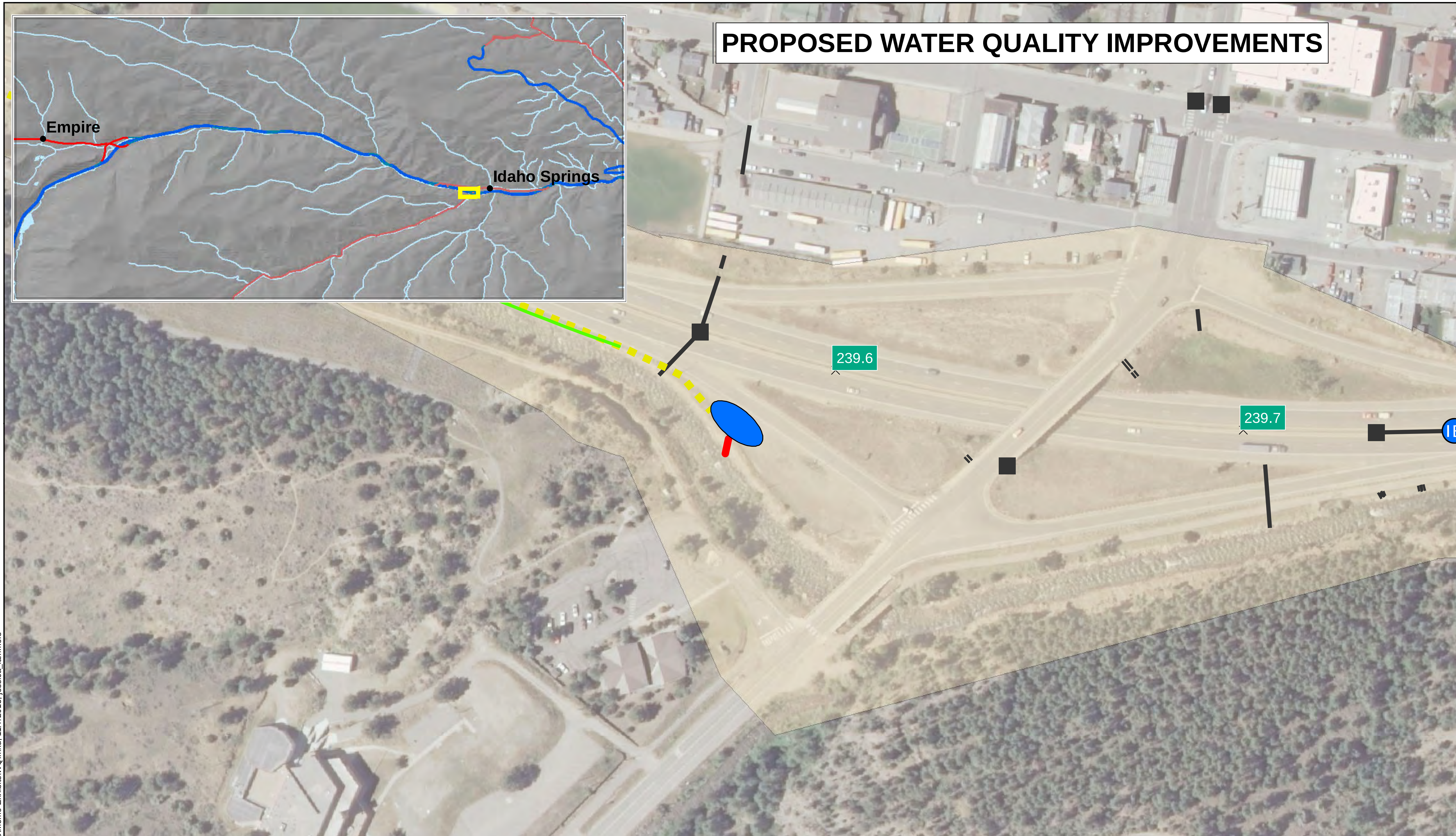

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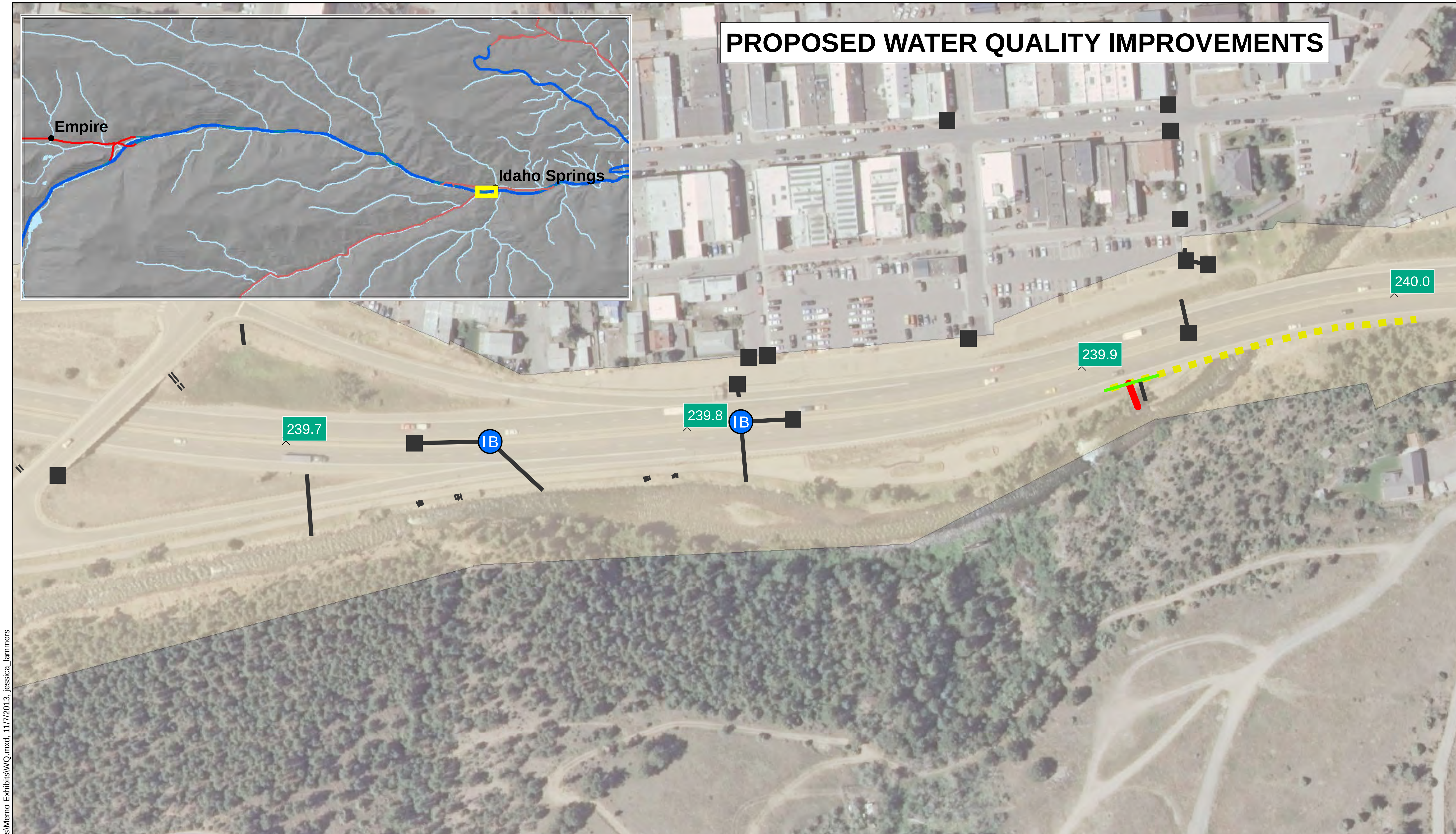

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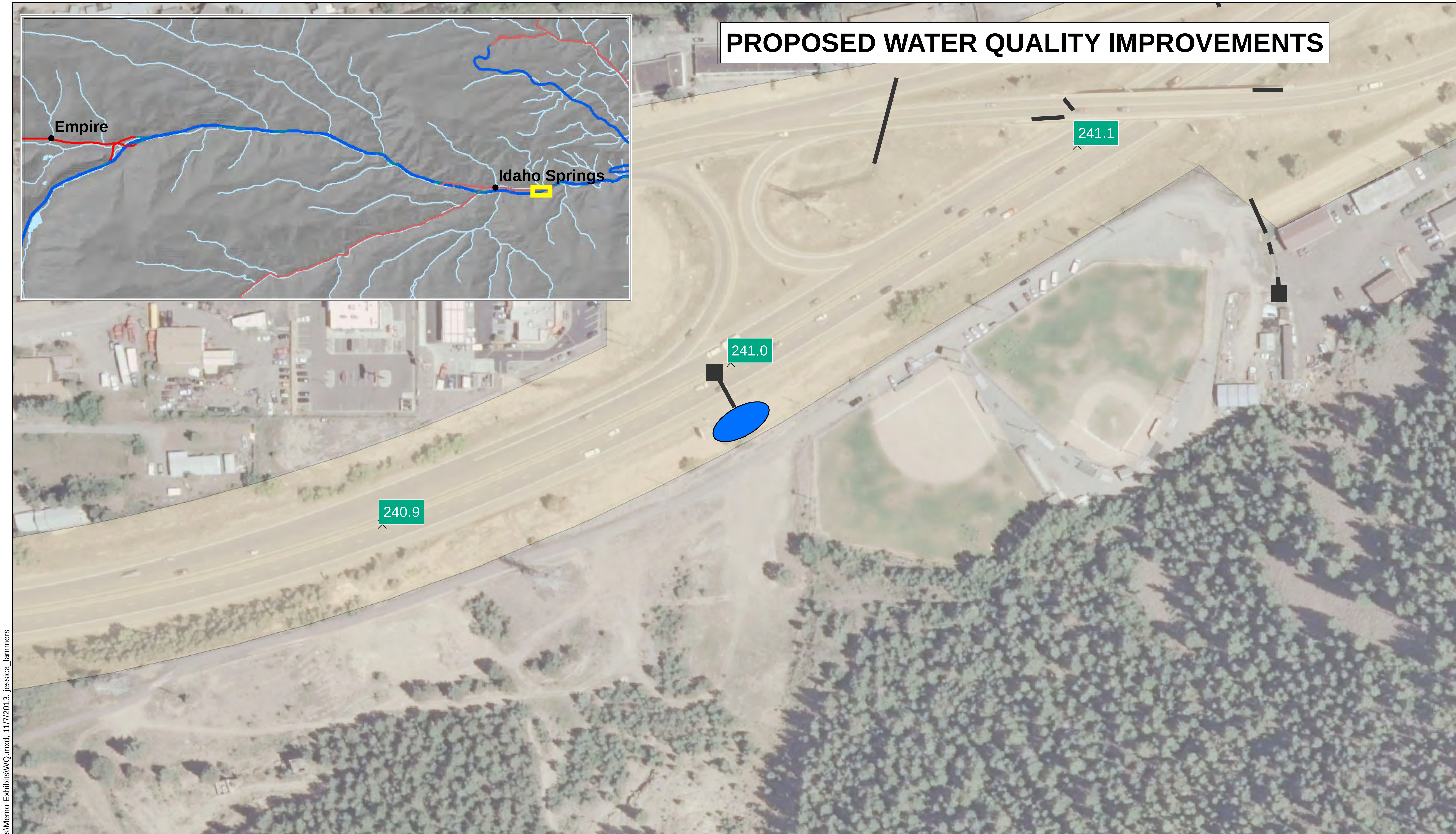

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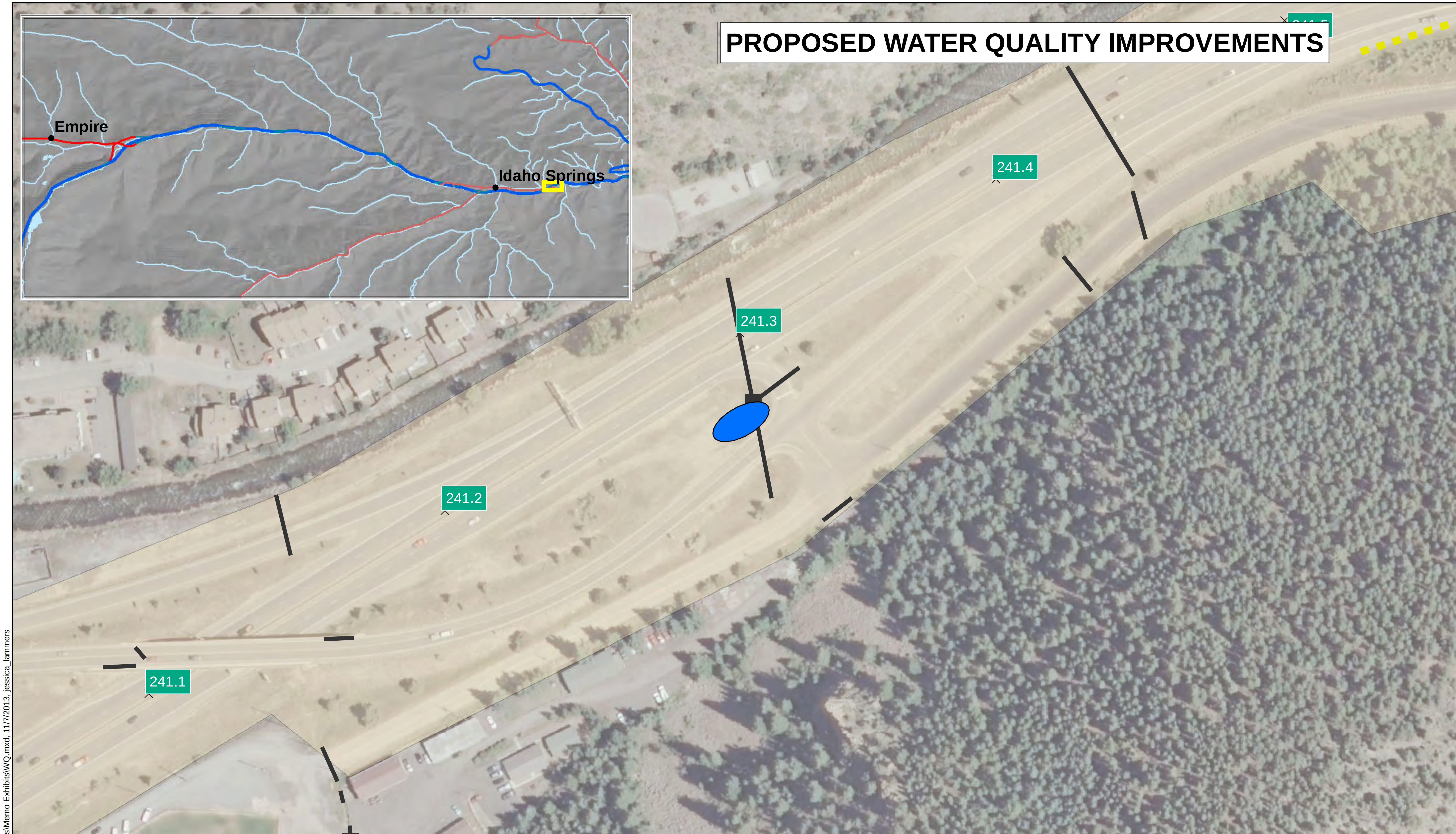

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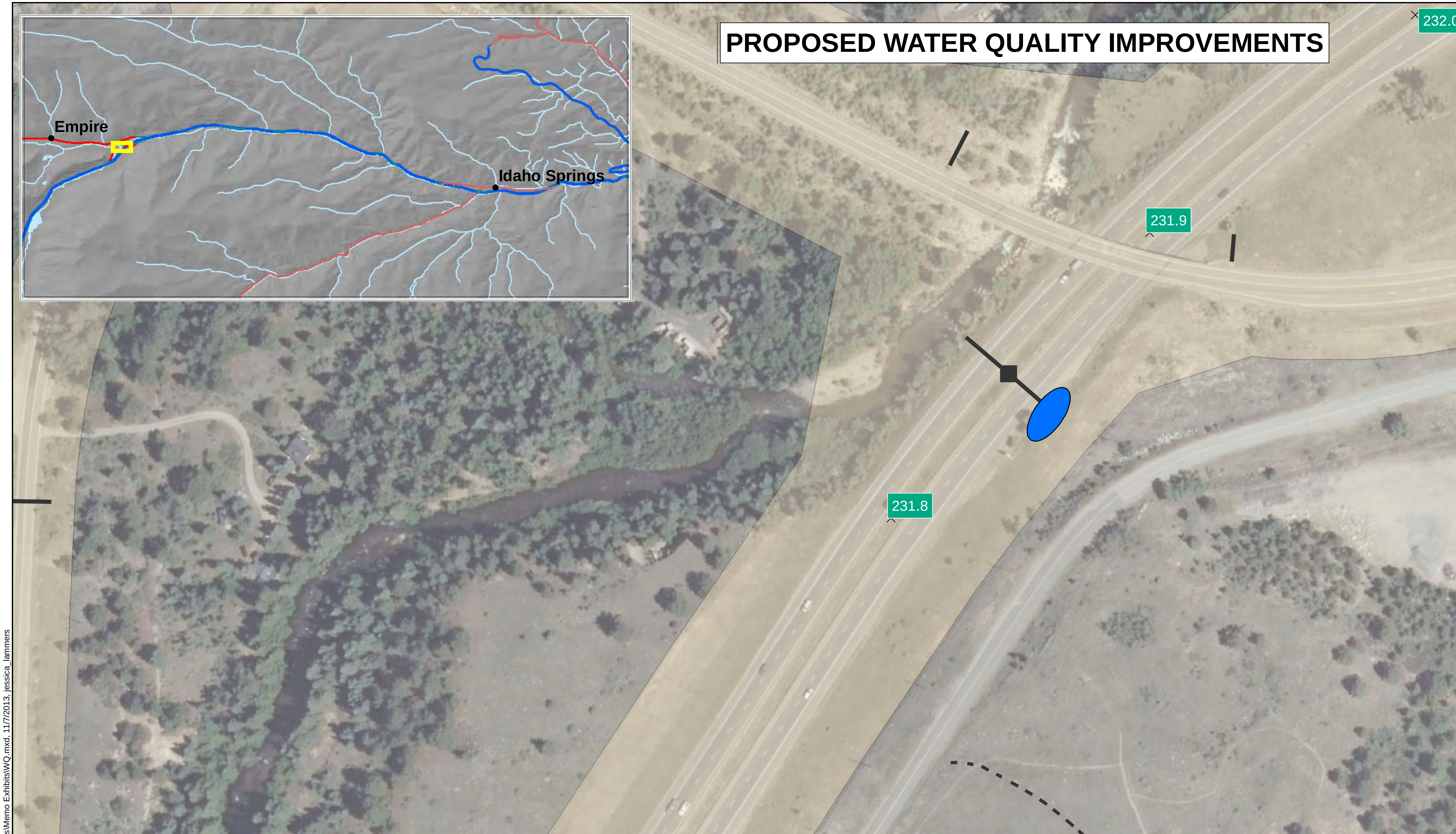

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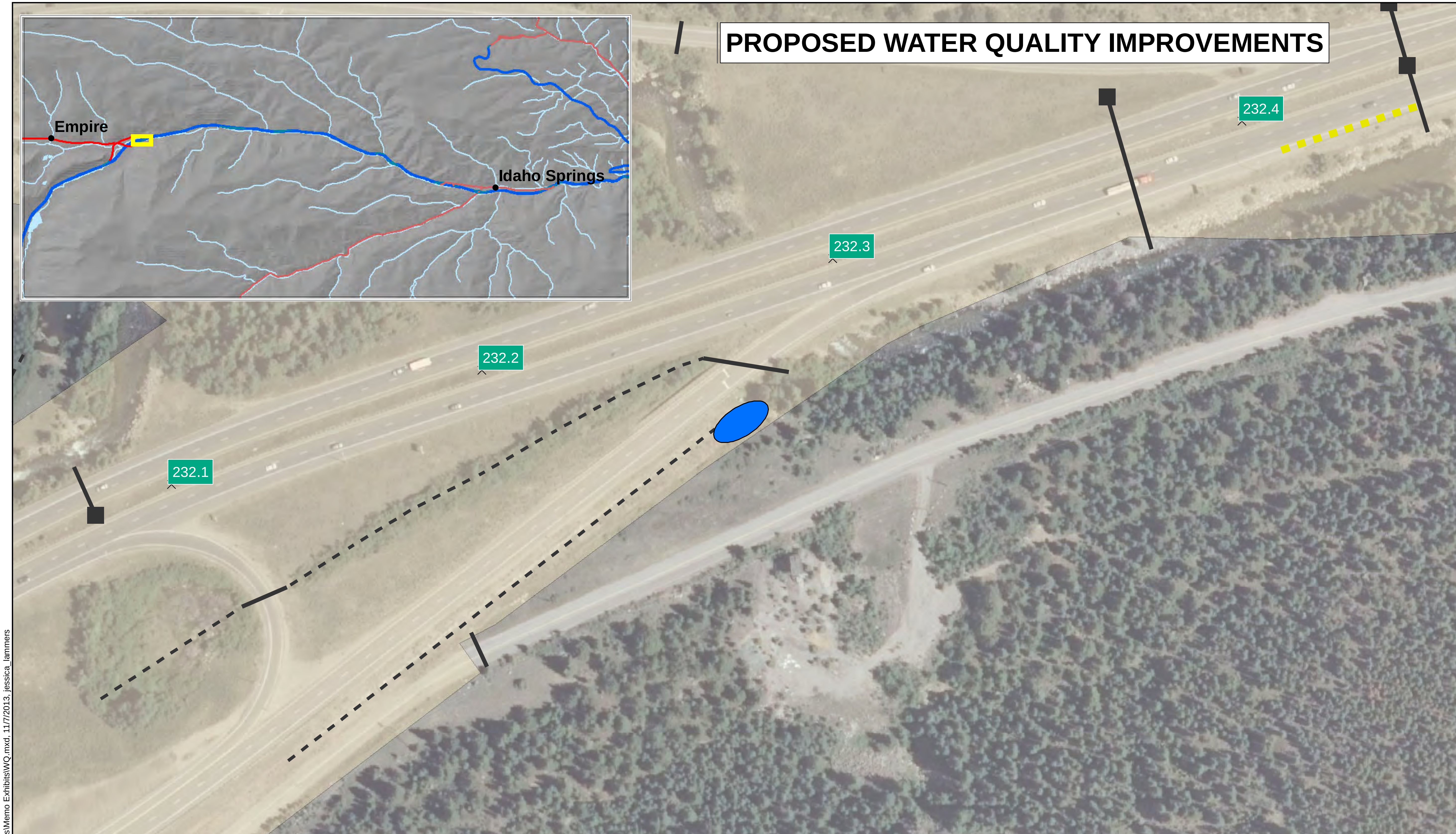

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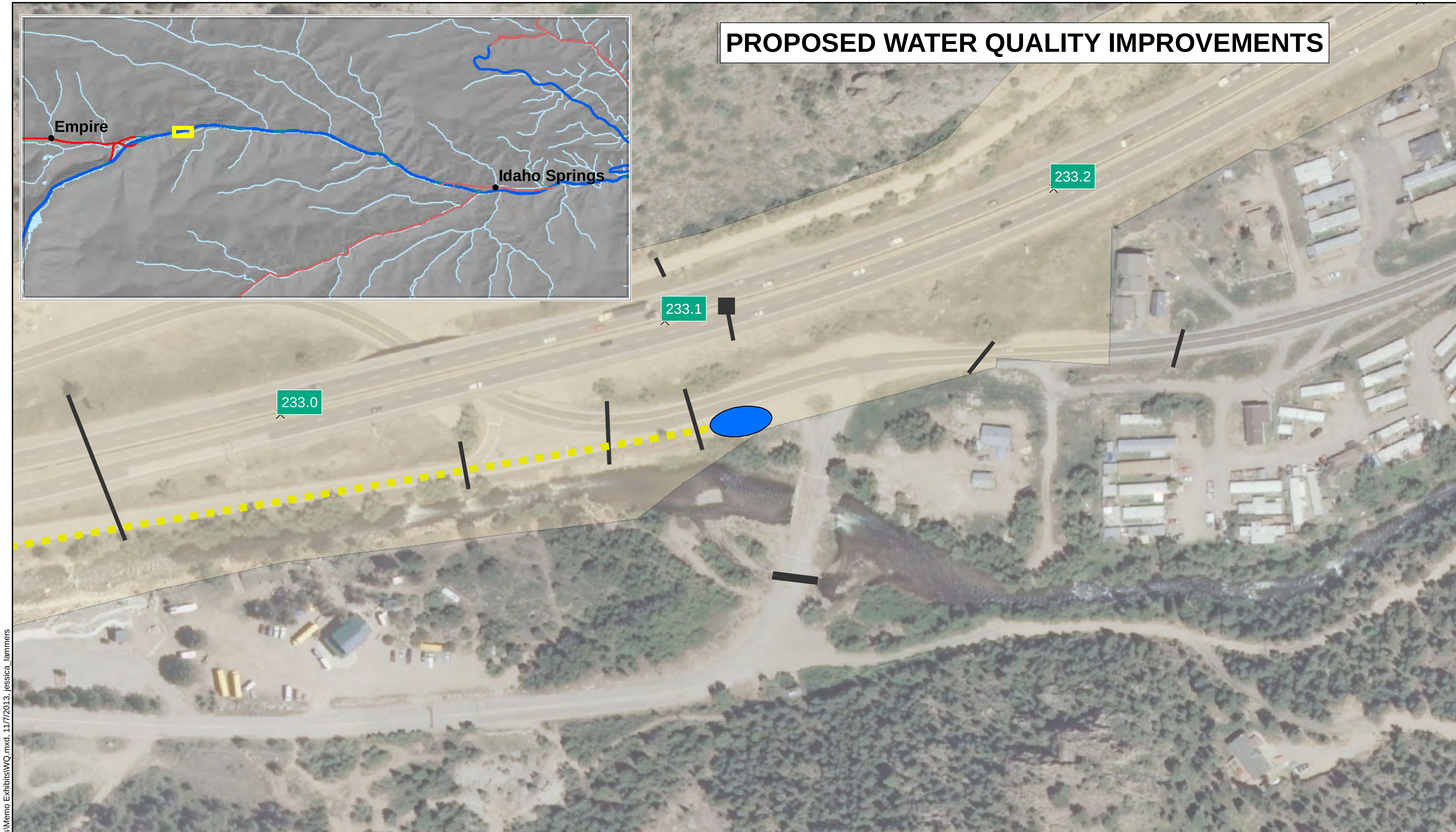

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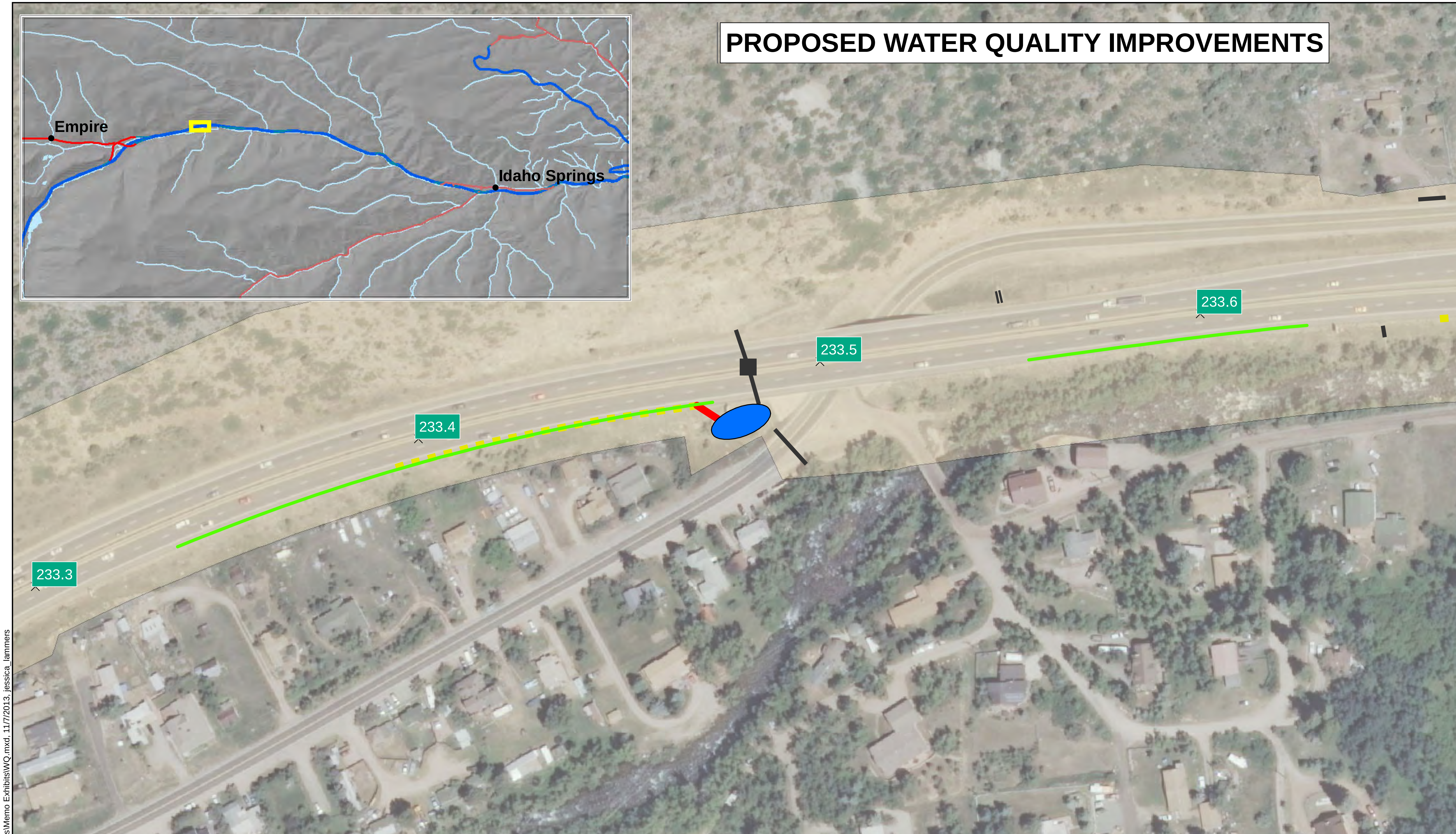

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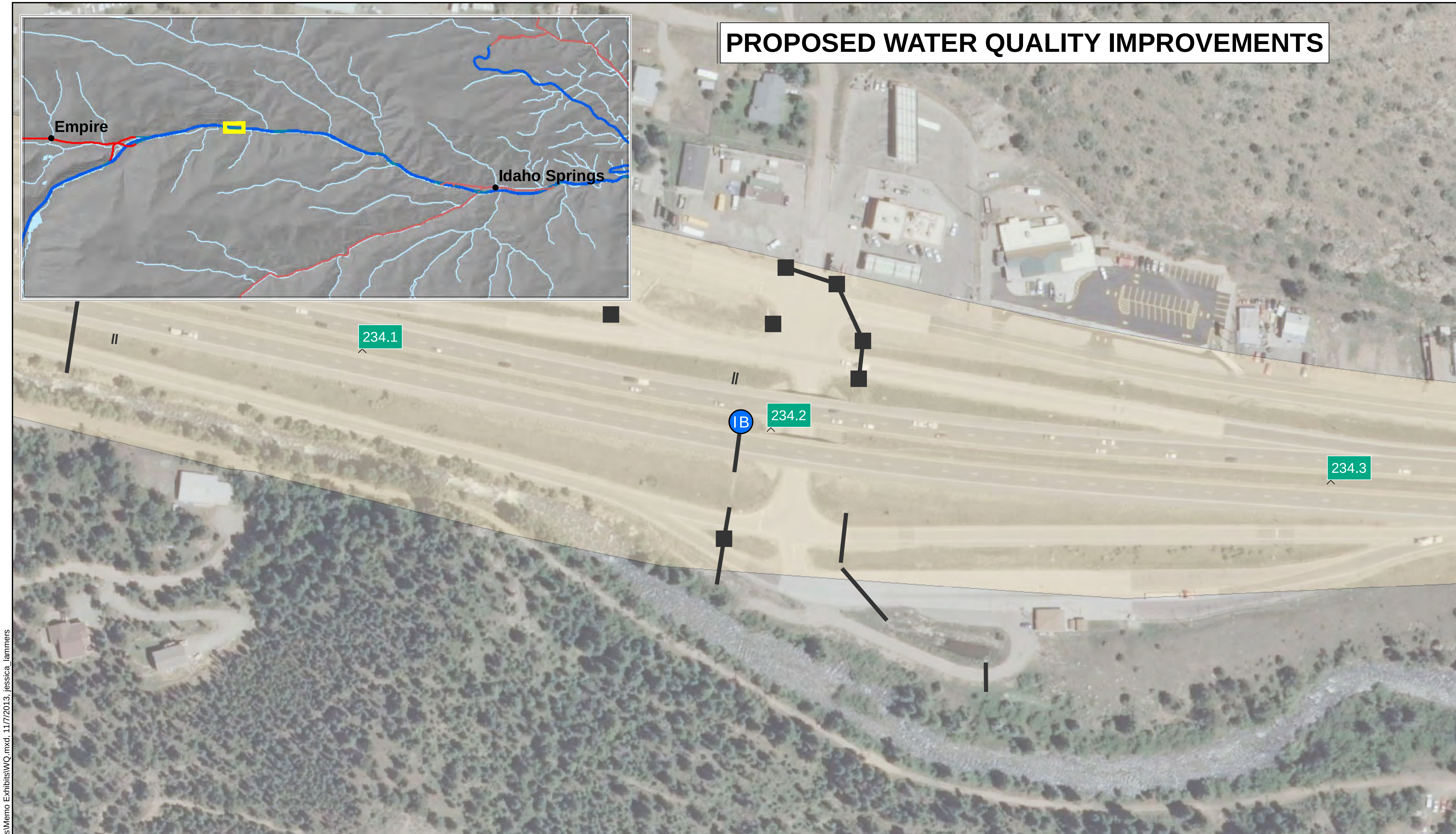

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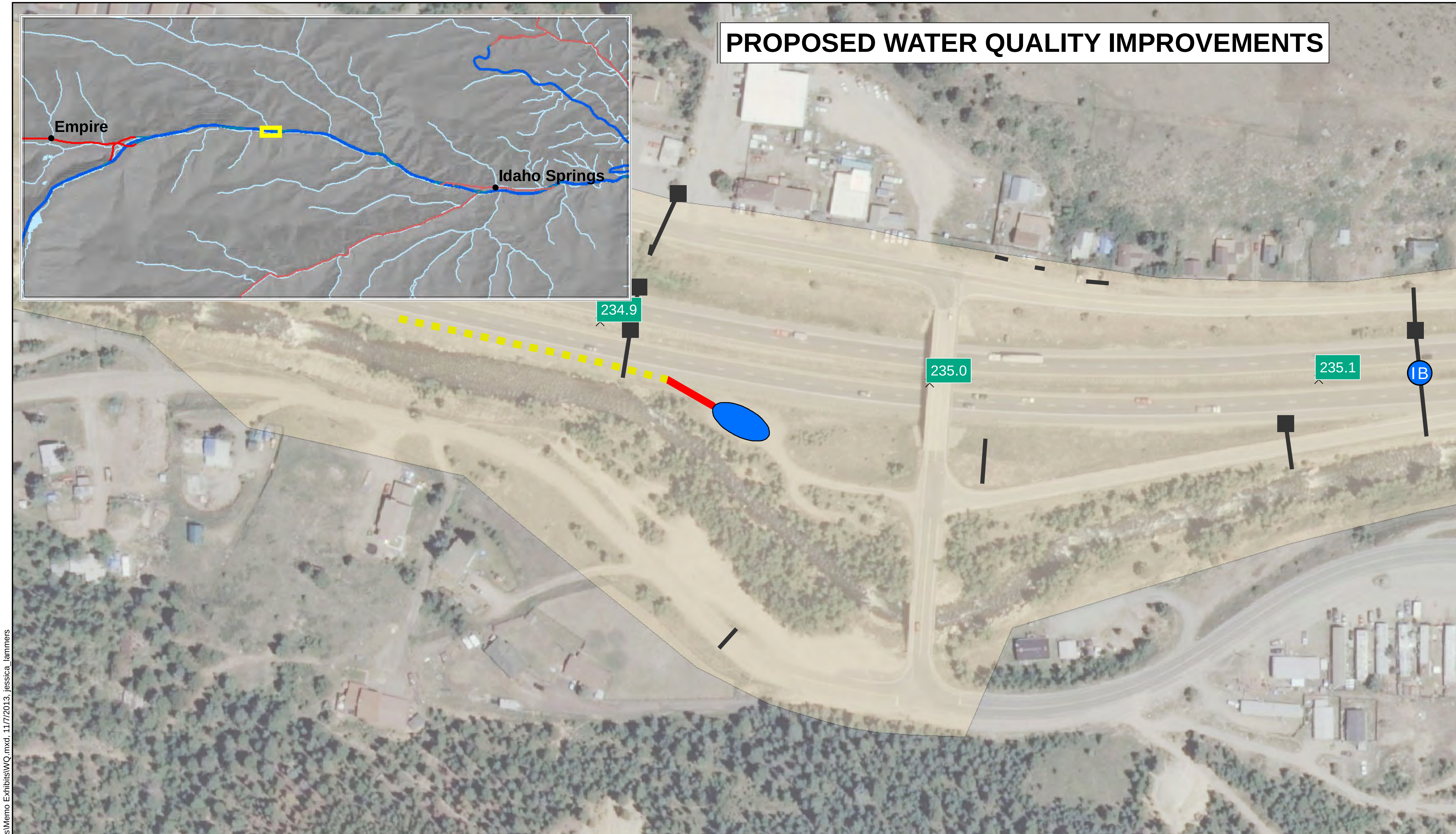

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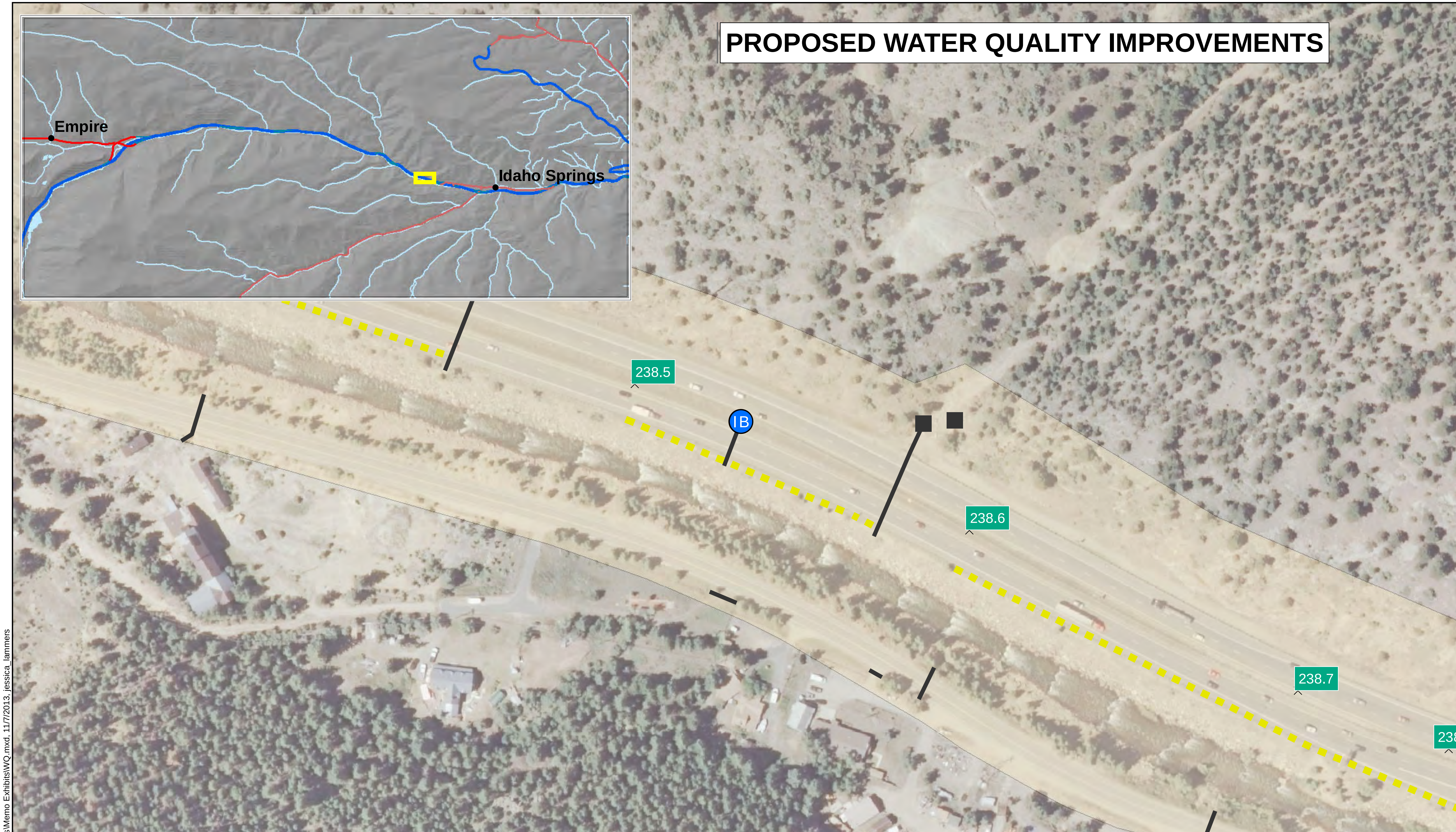

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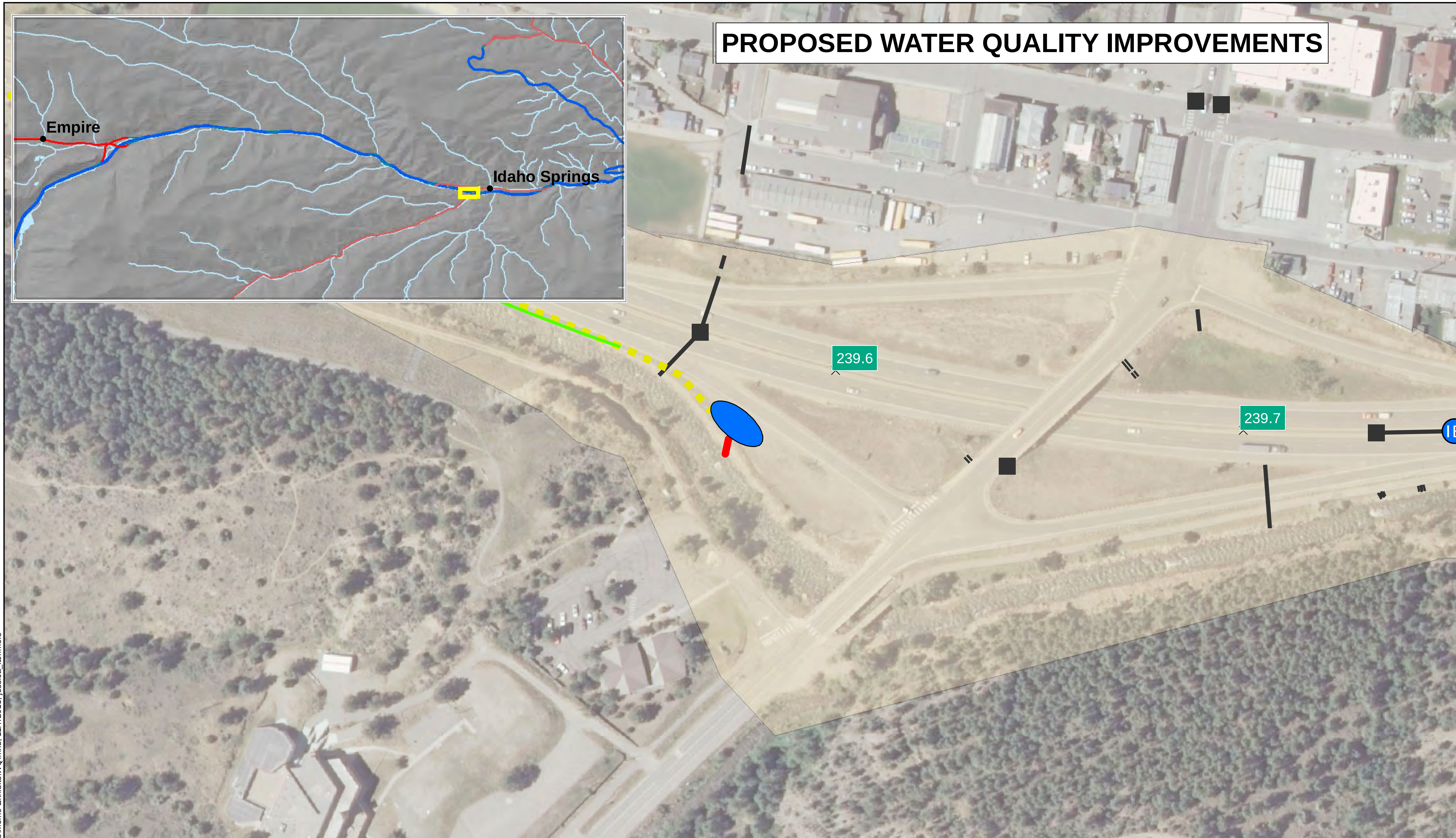

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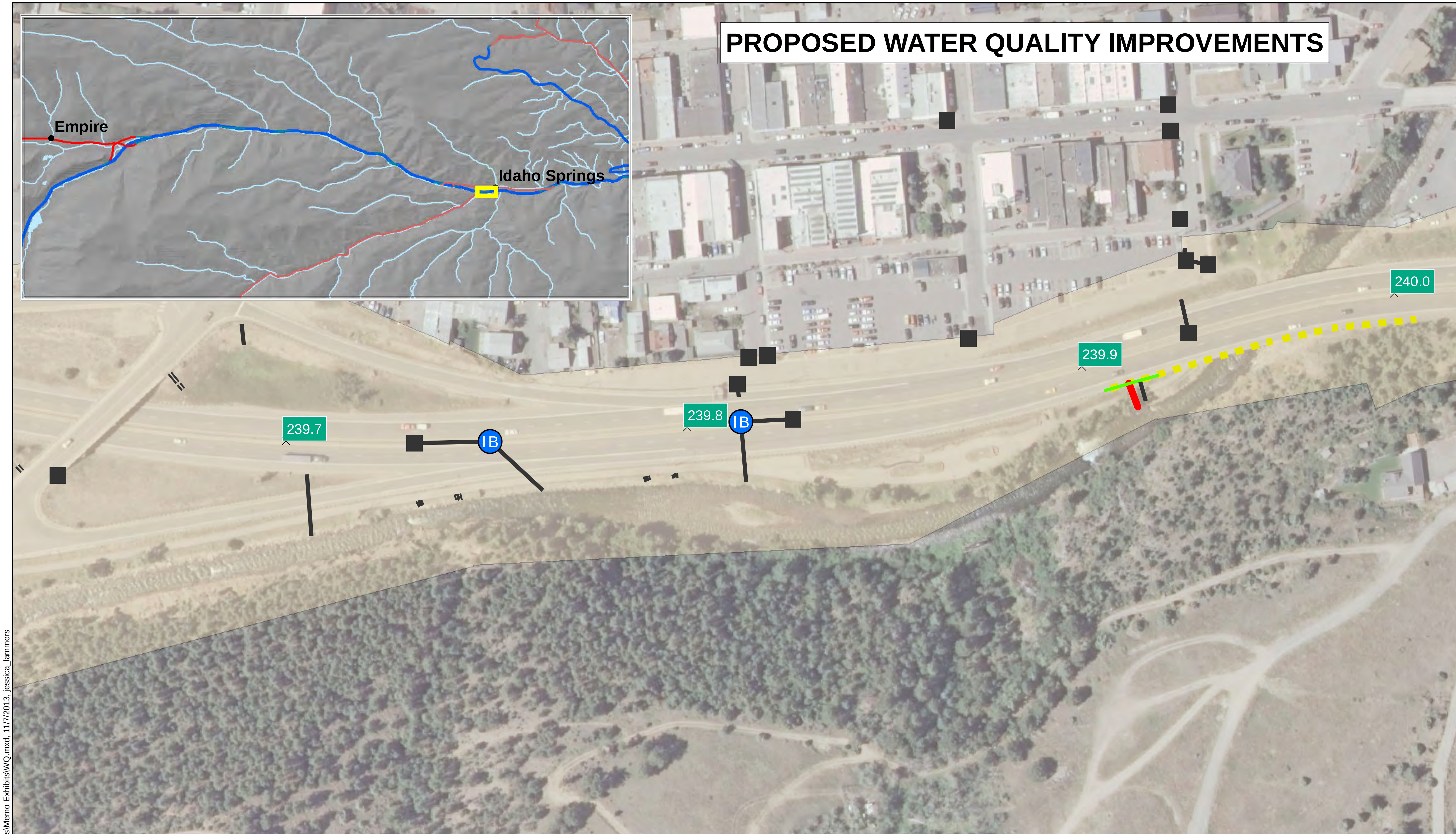
PROPOSED WATER QUALITY IMPROVEMENTS



Legend

- Proposed Sediment Basin
- IB Proposed Inlet Sediment Trap
- Proposed Retaining Wall
- Proposed Curb & Gutter
- Proposed Rundown
- Existing Inlet
- Existing Rundown
- Existing Channel/Ditch
- Existing Culvert
- Mile Marker
- CDOT ROW

N

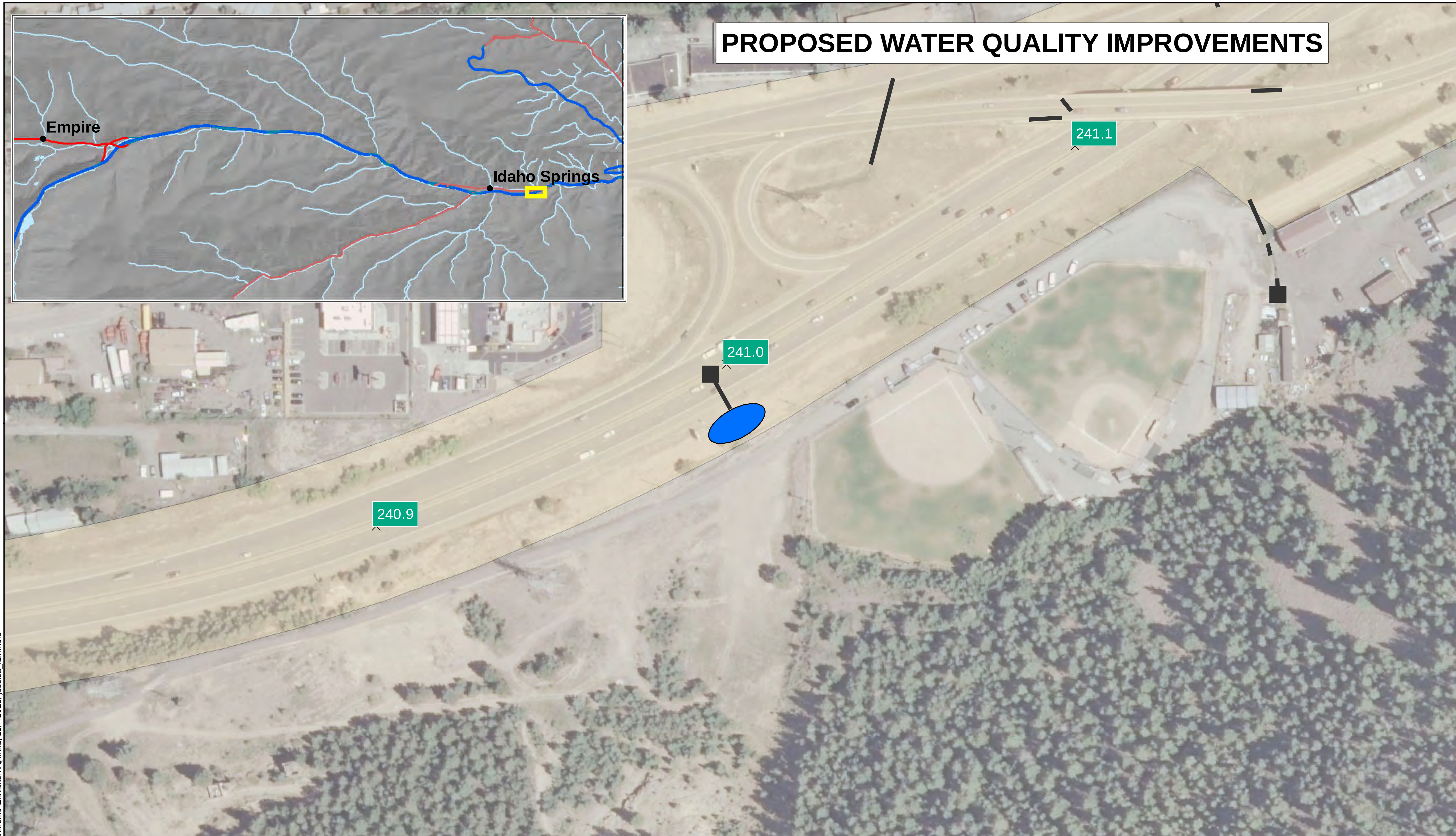
0 250 500 Feet

I-70 EASTBOUND PEAK PERIOD SHOULDER LANE

Date: November 7, 2013

Data Source: CDOT, DRCOG

FILE: G:\gis_projects\CDOT_PPSL\active\apps\Memo Exhibits\WQ.mxd, 11/7/2013, jessica_lammers



Legend

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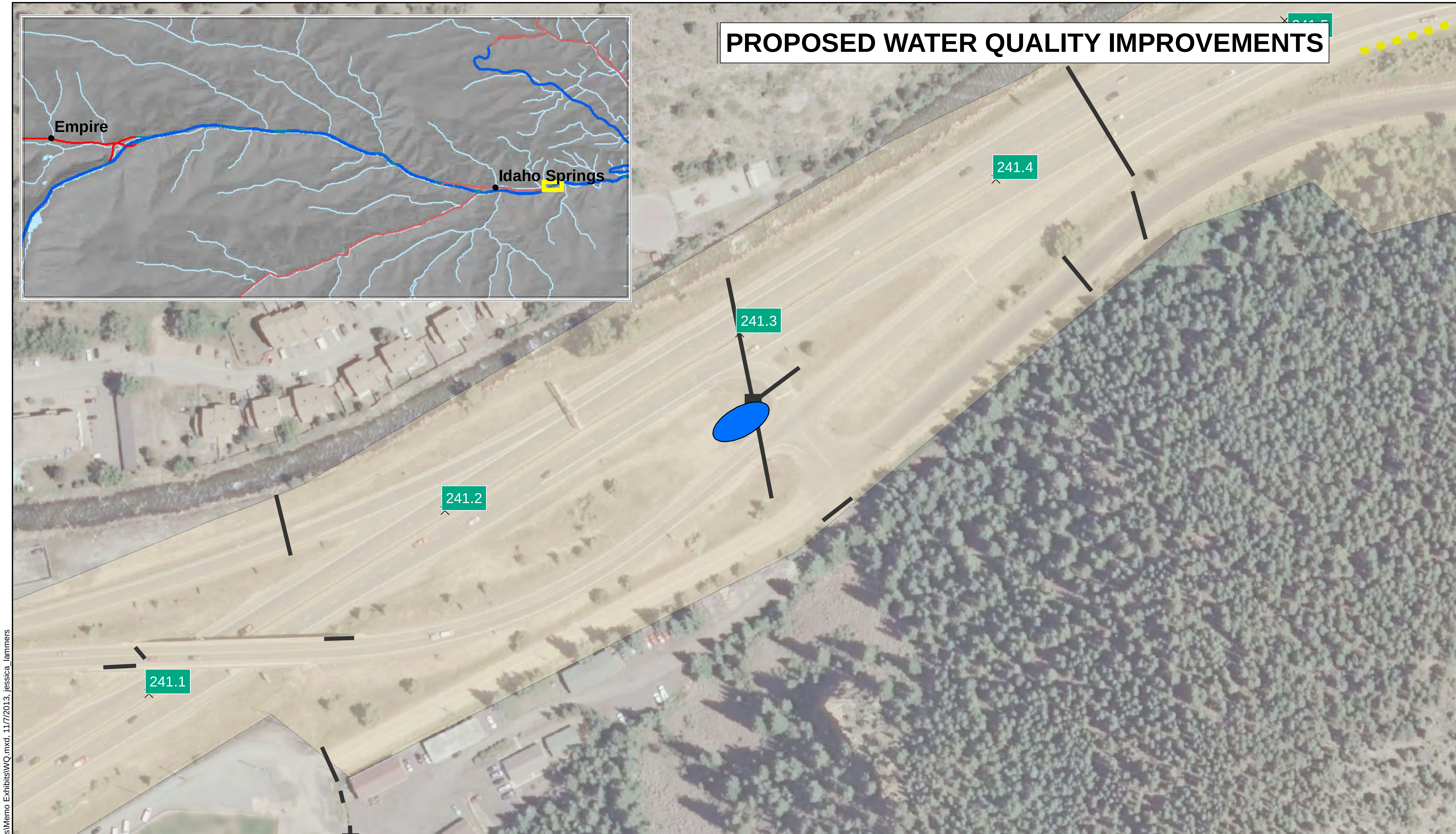

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