2017 Reconnaissance and Detailed Fish Passage Assessment Evaluations

Highway 101 – Santa Barbara County
Highway 192 – Santa Barbara County

July 2017

Prepared For:

California Department of Transportation
Division of Environmental Analysis
Office of Biology and Technical Assistance
Sacramento, CA USA

Table of Contents

Figures

Tables

Photographs

1. Background

During April of 2017, eight (8) Reconnaissance Fish Passage Surveys were conducted on state highways in Santa Barbara County. Four sites were surveyed on Highway 101 in Santa Barbara County and 4 sites were surveyed on Highway 192 in Santa Barbara County (**Figure 1**). The Reconnaissance Surveys were performed in accordance with the California Department of Transportation's (Caltrans') *Reconnaissance Fish Passage Assessment Instructions and Procedures Manual*[1]. Seven of the 8 sites (approximately88%) were identified as requiring a Detailed Fish Passage Survey.

The primary objective of the Reconnaissance Survey is to determine whether any given highway-stream crossing may potentially be an anadromous fish-bearing stream based on characteristics of the stream and the crossing. The Reconnaissance Survey includes both field and office activities. Field activities include documenting whether a natural stream channel is present, whether the site is primarily used for conveying stormwater and/or is a concrete-lined floodway, and evaluating basic stream channel width and gradient criteria. In addition to documenting characteristics of the crossing and the stream channel at each survey site, aerial imagery also is reviewed and a literature review is conducted to identify streams that may currently support or historically supported anadromous fish, in order to support a determination on whether further surveying effort is required, and to assist in prioritization of future survey efforts.

Reconnaissance Survey sites that do not meet the basic criteria for potentially being an anadromous fish-bearing stream or are known to have not historically supported anadromous salmonids (e.g., due to a natural migration barrier downstream of the site) are identified as not needing a Detailed Survey, as defined in Caltrans' *Detailed Fish Passage Assessment Data Collection Instructions and Procedures Manual*[2]. Sites identified as needing a Detailed Survey require additional information to be collected during the Reconnaissance Survey, including information on: (1) land ownership upstream and downstream of the site (to the extent possible); (2) whether the site is accessible via the highway for conducting a Detailed Survey; (3) whether vegetation removal is required to conduct a Detailed Survey; and (4) whether the crossing is classified as a confined space. Up to four photographs are taken at each surveyed site, to the extent possible, including: (1) upstream of the crossing looking upstream; (2) upstream of the crossing looking downstream; (3) downstream of the crossing looking upstream; and (4) downstream of the crossing looking downstream.

The results of the Reconnaissance Surveys performed during April of 2017 in Santa Barbara County are summarized in this report by county, route and postmile (**Appendix A**). For each surveyed site, the information collected during the Reconnaissance Survey is displayed, in addition to basic hydrologic unit classifications for the site, the stream name (if available), whether the site historically supported anadromous salmonids (if known), and photographs of the site. If a determination was made that a site requires a Detailed Survey, additional information is displayed, including land ownership information, site accessibility for conducting a Detailed Survey, whether vegetation removal is needed to conduct a Detailed Survey, and whether the site may be a confined space. Site-specific photographs taken during the Reconnaissance Surveys are provided in **Appendix B**.

[1] California Department of Transportation (Caltrans). 2007. Reconnaissance Fish Passage Assessment Instructions and Procedures. Prepared by HDR Engineering, Inc.

[2] California Department of Transportation (Caltrans). 2007. Detailed Fish Passage Assessment Data Collection Instructions and Procedures. Prepared by HDR Engineering, Inc.

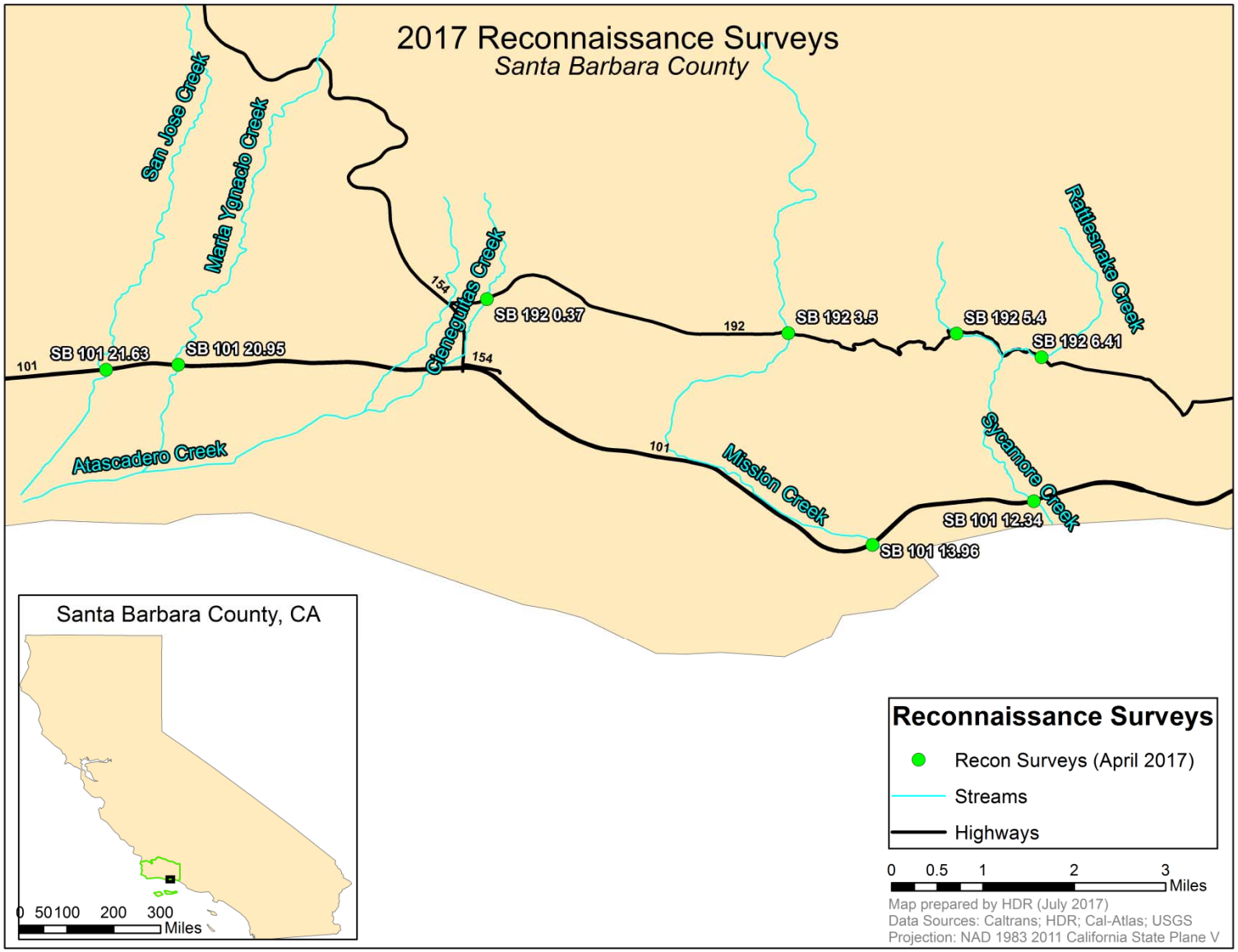

Figure 1. Reconnaissance Survey Locations in Santa Barbara County

2. Detailed Fish Passage Survey Sites

The Detailed Surveys conducted and discussed in this report only included sites that could be accessed and surveyed within the Caltrans Right of Way (ROW) or public lands with open access. Sites requiring a Detailed Survey that require access to private lands may be conducted in the future, depending on landowner permission.

Sites requiring a Detailed Survey were evaluated using GIS with public lands GIS data and aerial imagery in order to identify sites with public lands upstream and downstream of each site, or within the Caltrans ROW. **Table 1** displays the resulting sites requiring a Detailed Survey identified as located within the Caltrans ROW or on open access public land.

Table 1. Sites requiring a Detailed Survey on Open Access Public Land

County	Route	Postmile
Santa Barbara	101	12.34
Santa Barbara	101	13.96
Santa Barbara	101	20.95
Santa Barbara	101	21.63
Santa Barbara	192	0.37
Santa Barbara	192	3.5
Santa Barbara	192	5.4

It was determined that one site on Highway 192 in Santa Barbara County requiring a Detailed Survey on public lands could not be surveyed due to highway safety considerations and excessively thick vegetation surrounding the site. Road conditions on Highway 192 were observed to be relatively dangerous due to limited shoulder width along most of the highway, numerous blind corners, and relatively fast-driving vehicles.

Table 2 displays all sites that were identified as requiring a Detailed Survey and whether they were surveyed or not. For sites that were not surveyed, the table includes the reason(s) why the site was not surveyed. Photographs were taken at the site to assist in identifying remedial measures in order to conduct a Detailed Survey in the future. **Figure 2** displays the sites where a Detailed Survey was conducted. Four surveys were conducted on Highway 101 in Santa Barbara County, and one survey was conducted on Highway 192 in Santa Barbara County.

Table 2. All Sites in Santa Barbara County Determined to Require a Detailed Survey

County	Route	Postmile	Public Land	Surveyed?	Reasons for No Survey
SB	101	12.34	Yes	Yes	
SB	101	13.96	Yes	Yes	
SB	101	20.95	Yes	Yes	
SB	101	21.63	Yes	Yes	
SB	192	0.37	Yes	Yes	
SB	192	3.5	Yes	No	Greater than 20% Gradient
SB	192	5.4	Yes	No	Heavy Vegetation, Shoulder Width, and Blind Corners
SB	192	6.41	No	No	Private Property

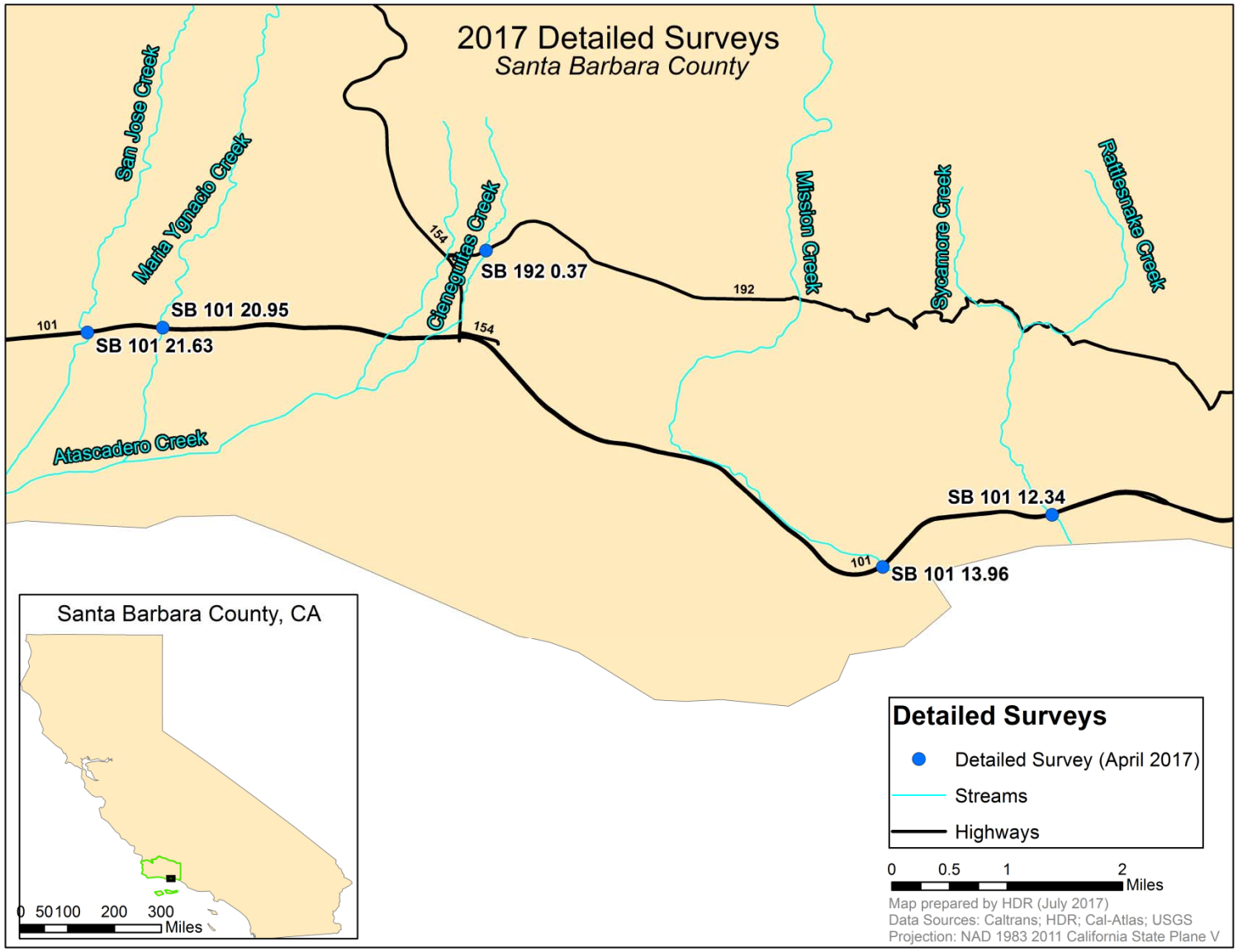

Figure 2. Detailed Fish Passage Surveys Conducted in Santa Barbara County.

3. Detailed Survey Data Collection and Post-Processing

In order to evaluate fish passage at highway crossings where a Detailed Survey was conducted, the raw survey data collected are first post-processed. The survey data collected at each site for the longitudinal stream profile (i.e., based on survey locations along the stream bottom from upstream of the crossing to downstream of the crossing), the tailwater (TWC) cross-section (i.e., based on survey locations perpendicular to the stream along the downstream TWC), and road fill volume consists of an X, Y and Z (elevation) coordinate for each survey point. The survey point coordinates for each site were converted into relative distance and elevation in Microsoft Excel, in order to allow for calculation of the following site parameters:

- Upstream channel slope
- Inlet apron slope and length, if applicable
- Culvert slope
- Outlet apron slope and length, if applicable
- Total culvert length
- Downstream channel slope
- Residual inlet depth
- Residual outlet depth
- Road fill volume estimate

If a site includes more than one culvert, then culvert slope and length, and residual inlet and outlet depths are calculated separately for each culvert, to the extent feasible. Resulting site-specific parameters for each Detailed Survey site are shown in **Table 3**. Fill volume survey points were not taken at the survey sites in Santa Barbara County due to roadside safety hazards. Fill volumes for the detailed survey sites can be evaluated and ranked qualitatively using photographs and notes taken during the surveys.

Table 3. Site parameters – culvert slope and length, residual inlet and outlet depths, upstream channel slope, and downstream channel slope.

County	Route	Postmile	Culvert #	Culvert Slope (%)	Residual Inlet Depth (ft)	Residual Outlet Depth (ft)	Total Culvert Length (ft)	Upstream Channel Slope (%)	Downstream Channel Slope (%)
SB	101	12.34	1	0.8	-1.75	-0.68	130.82	0.4	-1
SB	101	13.96	1	-0.1	-0.65	-0.84	142.51	1	-0.8
SB	101	20.95	1	0.3	-0.97	-0.52	175.34	-0.2	3.3
SB	101	21.63	1	0.1	-0.14	0	133.74	0	2
SB	192	0.37	1	3.7	-3.52	-0.87	71.22	2.3	6.4

4. Evaluation of Detailed Survey Sites

The first step in evaluating fish passage at each highway-stream crossing consists of applying the California Department of Fish and Wildlife (CDFW) Passage Evaluation Filter based on the survey calculations described above. The CDFW Passage Evaluation Filter allows for an initial evaluation of whether a crossing likely provides fish passage at all potential flows (identified as "green"), likely does not provide passage (identified as "red"), or may provide passage at some flows (identified as "gray") (Taylor and Love 2003).

As described by Taylor and Love (2003), in general:

1. If the site provides unrestricted flow, there is no drop at the outlet, and water depth is at least 0.5 feet throughout the facility, then fish passage is provided (Green).
2. If the site restricts flow, there is a drop of > 2 feet or the gradient along the facility is > 3 % (depth < 0.5 feet), the site does not provide fish passage (Red).
3. If the outlet drop is < 2 feet, but the depth is less than 0.5 feet or baffles or weirs are present, the site needs further evaluation (Gray).

Results of applying the CDFW Passage Evaluation Filter, as well as the reason for each site's filter determination, are provided in **Table 4**. After identifying the filter result for each evaluated site, site photos were examined to confirm the filter results, particularly for the sites that were identified as providing unrestricted fish passage.

Based on simply applying the filter, four sites were identified as "green" and one site was identified as "red." However, an asterisk after the filter result in the table indicates that the filter result may not be representative of actual fish passage conditions, based upon site-specific observations. Site-specific discussions for these sites are provided below.

Table 4. CDFW Fish Passage Evaluation Filter Results

County	Route	PM	Fully Embedded?	Inlet Width > ACW	Residual inlet/outlet depths ≥ .5'	Outlet Drop ≥ 2'	Culvert Slope ≥ 3%	Filter Result	Reason for Filter Result
SB	101	12.34	Yes	Yes	No	No	No	Green	Inlet width greater than ACW
SB	101	13.96	Yes	Yes	No	No	No	Green	Inlet width greater than ACW, downstream crossing constricts ACW
SB	101	20.95	Yes	Yes	No	No	No	Green*	Inlet width greater than ACW, may be some constriction at confluence
SB	101	21.63	Yes	Equal	No	No	No	Green*	Inlet width equal to ACW, channel constrained by concrete wall throughout reach both upstream and downstream of site
SB	192	0.37	No	No	No	Yes	Yes	Red	Inlet width is not greater than the ACW, outlet drop is greater than 2 ft. and culvert slope is greater than 3%

SB 101 12.34 – This site ranked as "green" because the inlet to the crossing was greater in width than the active channel and the active channel substrate was natural streambed (**Photo 1**).

SB 101 13.96 - This site ranked as "green" because the inlet to the crossing was greater in width than the active channel and the active channel substrate was natural streambed; there was an additional crossing downstream of the survey site which was constricting the active channel width (**Photo 2**).

SB 101 20.95 – This site ranked as "green" because the inlet to the crossing was greater in width than the active channel, however, the crossing is directly downstream of the Maria Ygnacio Creek and San Antonio Creek confluence and there may be some potential constriction of the natural width of the confluence (**Photo 3**). However, the crossing does not appear to be limiting fish passage conditions. Downstream of the crossing there is an abrupt drop in elevation of approximately 7 feet which is unrelated to the crossing (**Photo 4**).

SB 101 21.63 – This site ranked as "green" because the active channel is equal in width to the inlet width of the crossing. Concrete flood control walls channelize the stream throughout the reach, both upstream and downstream of the crossing survey site (**Photo 5**).

SB 192 0.37 – This site ranked as "red" because the active channel width was greater than the culvert width and the downstream hydraulic drop was greater than two feet (**Photo 6**).

Photo 1. Route 101 (PM 12.34), looking upstream from crossing along Sycamore Creek.

Photo 2. Route 101 (PM 13.96), looking upstream along Mission Creek.

Photo 3. Route 101 (PM 20.95), looking upstream at the confluence of Maria Ygnacio Creek and San Antonio Creek.

Photo 4. Route 101 (PM 20.95), looking upstream at abrupt channel elevation drop approximately 250 ft. downstream of surveyed crossing.

Photo 5. Route 101 (PM 21.63), San Jose Creek, looking upstream at concrete walls throughout survey site.

Photo 6. Route 192 (PM 0.37), Cieneguitas Creek, looking upstream at outlet drop.

5. Upstream Habitat Availability Evaluation

The one site identified as "red" (PM 0.37 on highway 192) by the CDFW Passage Evaluation Filter was further evaluated in terms of the potential quantity of habitat that could be recovered upstream of a crossing if the crossing was remediated to allow unimpaired fish passage. Information to conduct this evaluation included site-specific habitat information collected during the Reconnaissance and Detailed surveys, quality and quantity of potential habitat upstream of a crossing based on GIS analyses, a literature review of fisheries habitat surveys, and previously-conducted fish passage assessments.

Previously conducted road-stream crossing fish passage evaluations estimated the length of habitat potentially available upstream of a crossing based on stream gradient (e.g., Lang 2005; Marin County 2003). Based on a literature review of stream gradient and upstream habitat limits of steelhead, R2 Resource Consultants (2007) reported that a slope of approximately 12%, as discernable over 100 m using digital elevation models (DEMs), would likely limit upstream passage of steelhead (and coho salmon) in northern California coastal streams. This criterion reportedly corresponds to the limiting value used to define intrinsic habitat potential for steelhead in northern California streams by NMFS (Agrawal et al. 2005, as cited in R2 Resource Consultants 2007). Because of the specific application of this recommendation to GIS analysis, the 12% gradient over 100 m (~328 ft) was applied in this report.

The steps summarized below describe the GIS methods employed to calculate stream gradient of individual segments for the only evaluated stream (SB 192 0.37), in order to estimate potential length of anadromous fish habitat upstream of the crossing.

- Downloaded USGS digital elevation model (DEM) layers (NHD Plus) covering Marin and San Mateo counties. All layers were converted to the NAD 1983 California (Teale) Albers projection. A personal geodatabase was created to store all datasets for this exercise.
- The DEM layer was clipped to the spatial extent Santa Barbara County.
- The following processing functions within the Hydrology toolset (located in the Spatial Analyst toolbox) were applied to the DEM layer in order to identify natural stream pathways, and delineate an upstream watershed for the site. For all processes, the cell size of the output raster was set to equal the cell size (i.e., 30 m) of the respective input raster.
    - The Fill tool was run to remove any potential "sinks" in the DEM (i.e., cells that do not have a defined drainage value, and need to be removed from the dataset prior to delineating the watershed and streams).
    - The Flow Direction tool was run on the DEM in order to develop a flow direction grid (i.e., a grid that assigns a value to each cell that indicates the direction of flow).
    - The Flow Accumulation tool was run on the DEM which calculates the accumulated flow into each cell by summing the cells that flow into each downslope cell. The resulting Flow Accumulation raster was symbolized in order to display streams that generally corresponded with the streams from the National Hydrography Dataset (NHD), and set to display cells that received flow from 250 cells or more. The threshold of 250 cells was determined based on: (1) general consistency with the streams displayed in the NHD; and (2) to delineate potential streams not shown in the NHD that represented the drainage of the highway-stream crossing being evaluated.
    - Prior to running the next tool required to delineate the watershed, an "outlet pour point" needed to be specified in order to define the lowermost boundary of the watershed associated with the evaluated crossing. For the purposes of this analysis, the pour point is represented by the highway stream crossing for the site being evaluated. However, for the purposes of delineating an upstream watershed, the pour point for the surveyed site was manually moved from its actual location to better align with the intersection of the stream portrayed by the Accumulation Flow raster and Highway 192.
    - Ran Snap Pour Point tool using the pour point created in the previous step and the Flow Accumulation raster, to produce an outlet pour point raster, which represents the "outlet" or downstream extent of the watershed being evaluated.
- The Watershed tool was run, which utilizes the Flow Direction raster and the Pour Point raster, to delineate an upstream watershed for the evaluated site. The watershed raster was converted to a polygon feature class in order to further process and display the individual watershed.
- Within the Terrain Preprocessing toolset of the Arc Hydro toolbox, ran Stream Definition tool using 250 cells as a threshold for converting the Flow Accumulation raster into a stream "grid" to delineate streams for further processing. The stream grid was then processed with the Stream

Segmentation tool to create a stream segments raster (i.e., Stream Link Grid). The Stream Link Grid raster was then converted to features representing the stream network using the Stream to Feature Tool in the Spatial Analyst toolbox. The creation of a stream features layer that is based on the DEM that will be used to calculate stream gradient ensures that the streams layer and the DEM are properly registered (e.g., streams are not flowing uphill).

- Clipped the stream feature class to each individual watershed in order to individually process stream layers within each watershed.
- Stream segments residing within each watershed being evaluated were clipped to their respective watersheds such that the downstream extent of each stream feature generally corresponds with the highway-stream crossing. Ran the Densify tool (Editing toolbox) on the stream features layer to create vertices at a maximum of 100 m intervals.
- Ran the Split Line at Vertices tool (Data Management toolbox) for each stream feature class associated with each watershed to segment each stream reach between vertices in order to eventually calculate slope along each individual segment.
- Ran the Add Surface Information Tool (3D Analyst Toolbox) to generate elevations, slopes and surface lengths for individual stream segments for each stream feature class. Due to the discrepancy between the units in the DEM raster (cm) and the length units of the streams (m), the *z factor* parameter was inputted as .01 to correct for the difference in XY and Z units.
- Each stream segment within each stream feature class associated with each watershed was symbolized based on its average slope.

Based on the threshold of a 12% or greater slope occurring over approximately 100m or more of stream length, the length of each evaluated stream reach was calculated to estimate potential length of anadromous fish habitat within the evaluated crossing's upstream watershed (**Figure 3**).

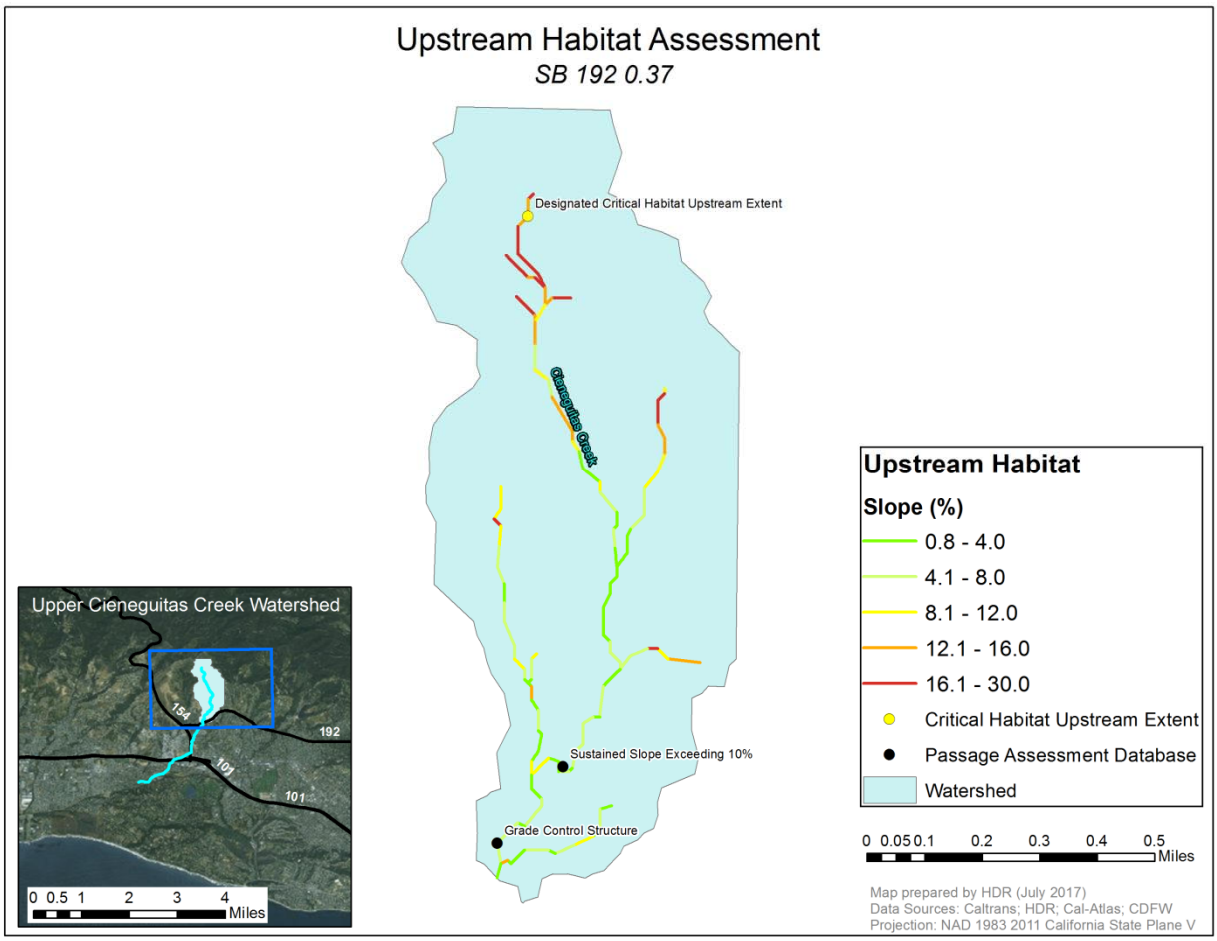

Figure 3. Stream gradient analysis and previously recorded barriers upstream of SB 192 0.37 (Cieneguitas Creek).

Upstream habitat on Cieneguitas Creek appears to be generally of poor quality for anadromous fish. Habitat conditions directly above the crossing can be characterized as a dense riparian corridor confined by residential properties. The creek is somewhat channelized by concrete and fencing likely used for flood control and property boundaries. High amounts of fine sediment including silt and sand found upstream of the HWY 192 crossing likely suggests poor spawning and embryo incubation habitat conditions for anadromous salmonids. The fish passage survey was conducted during April of a wet water year and the upstream and downstream reaches of the crossing were dry, suggesting that the upstream reach of Cieneguitas Creek above the crossing is unlikely to provide suitable over-summering rearing habitat for juvenile steelhead.

GIS gradient analysis suggests that an extended section of creek with an average gradient of greater than 12% is located approximately one mile upstream of the crossing (Figure 3). The upstream extent of critical habitat designated by NMFS for the Southern California Steelhead ESU is located approximately 0.5 mile further upstream and 1.5 miles upstream from the surveyed crossing (70FR52580; Figure 3). The CDFW Passage Assessment Database (PAD) noted two additional upstream locations as potential fish barriers - a gradient control structure located approximately 0.05 miles upstream of the crossing, and

a reach of creek with a gradient slope of 10% or greater located approximately 0.25 miles upstream of the crossing (CDFW 2015; Figure 3).

6. References

Agrawal, A., R.S. Schick, E.P. Bjorkstedt, R.G. Szerlong, M.N. Goslin, B.C. Spence, T.H. Williams, and K.M. Burnett. 2005. Predicting the potential for historical coho, Chinook, and steelhead habitat in northern California. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-379. Southwest Fisheries Science Center, Santa Cruz CA.

California Department of Transportation (Caltrans). 2007. Detailed Fish Passage Assessment Data Collection Instructions and Procedures. Prepared by HDR Engineering, Inc.

California Department of Fish and Wildlife (CDFW). 2015. California Fish Passage Assessment Database. Available at: http://www.calfish.org/tabid/420/Default.aspx

Lang, M. 2005. California Department of Transportation District 1 Pilot Fish Passage Assessment Study: Volume 1 – Overall Results. Humboldt State University.

Marin County. 2003. Marin County Stream Crossing Inventory and Fish Passage Evaluation. Final Report. Prepared by Ross Taylor and Associates.

R2 Resource Consultants. 2007. SWRCB Instream Flow Policy: GIS-Analysis Criteria for Upstream Limit of Steelhead. Technical Memorandum to State Water Resources Control Board.

Taylor, R. and M. Love. 2003. Part IX. Fish Passage Evaluation at Stream Crossings. California Stream Habitat Restoration Manual. California Department of Fish and Game.

Appendix A – Reconnaissance Survey Results

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 12.34**

Survey Information

Date	4/10/2017	**Time**	12:30 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.66972837	Latitude	34.42050195	
GPS HDOP		Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name	Sycamore Creek	Source:	1:24k USGS quad
Basin	Sycamore Canyon	Quad Name (7.5')	SANTA BARBARA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Santa Barbara

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population?	Yes

Source

Crossing Type

Crossing Type	Culvert	ID	
General Description:	Concrete box culvert under HWY 101, approx 7ft high and 25 ft wide.		

Photos

3.1 Upstream Looking Upstream - Photo I	SB_101_12.34_US_US
3.2 Upstream Looking Downstream - Photo I	SB_101_12.34_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_101_12.34_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_101_12.34_DS_DS

Detailed Survey Required?

Detailed Survey Required?:	**Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 12.34**

Access Information

Land Ownership:

Upstream	public	Owner(s)	unknown
Downstream	public	Owner(s)	unknown

Accessible from road?

Upstream?	Yes	Limitations
Downstream?	Yes	Limitations

Vegetation Removal Required?

Upstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments
Downstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments

Maintenance Assistance Required?

Upstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments
Downstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 13.96**

Survey Information

Date	4/10/2017	**Time**	14:00 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.69500312	Latitude	34.41311531	
GPS HDOP		Loc. of GPS Point	above outlet	PM

Hydrologic Information

Stream Name	Mission Creek	Source:	1:24k USGS quad
Basin	Mission Canyon	Quad Name (7.5')	SANTA BARBARA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Santa Barbara

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Southern California Steelhead

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population? Yes

Source

Crossing Type

Crossing Type: Culvert ID:

General Description: Concrete box culvert, passage under HWY 101 approx 15 ft high and 25 ft wide, fencing all along upstream and downstream locations.

Photos

3.1 Upstream Looking Upstream - Photo I	SB_101_13.96_US_US
3.2 Upstream Looking Downstream - Photo I	SB_101_13.96_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_101_13.96_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_101_13.96_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 13.96**

Access Information

Land Ownership:

Upstream	private	Owner(s)	unknown
Downstream	private	Owner(s)	unknown

Accessible from road?

Upstream?	No	Limitations	fence
Downstream?	No	Limitations	fence

Vegetation Removal Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Maintenance Assistance Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 20.95**

Survey Information

Date	4/10/2017	**Time**	14:40 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.80495215	Latitude	34.44199657	
GPS HDOP		Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name	Maria Ygnacia Creek	Source:	1:24k USGS quad
Basin	Goleta Slough	Quad Name (7.5')	GOLETA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Goleta

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population?	Yes

Source

Crossing Type

Crossing Type: Bridge w/ potential passage constraints ID:

General Description: Bridge with concrete artifical channel,large notched channel, large drop off into pool at downstream end.

Photos

3.1 Upstream Looking Upstream - Photo I	SB_101_20.95_US_US
3.2 Upstream Looking Downstream - Photo I	SB_101_20.95_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_101_20.95_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_101_20.95_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 20.95**

Access Information

Land Ownership:

Upstream	public	Owner(s)	county park
Downstream	public	Owner(s)	county park

Accessible from road?

Upstream? Yes Limitations

Downstream? Yes Limitations

Vegetation Removal Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Maintenance Assistance Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 21.63**

Survey Information

Date	4/10/2017	**Time**	15:15 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.81696633	Latitude	34.44129666	
GPS HDOP		Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name	San Jose Creek	Source:	1:24k USGS quad
Basin	Goleta Slough	Quad Name (7.5')	GOLETA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Goleta

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population?	Yes

Source

Crossing Type

Crossing Type: Bridge w/ potential passage constraints ID

General Description: Concrete bridge with concrete lined channel with notch.

Photos

3.1 Upstream Looking Upstream - Photo I	SB_101_21.63_US_US
3.2 Upstream Looking Downstream - Photo I	SB_101_21.63_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_101_21.63_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_101_21.63_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 101** **PM: 21.63**

Access Information

Land Ownership:

Upstream	public	Owner(s)	unknown
Downstream	public	Owner(s)	unknown

Accessible from road?

Upstream? Yes Limitations

Downstream? Yes Limitations

Vegetation Removal Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Maintenance Assistance Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 0.37**

Survey Information

Date	4/10/2017	**Time**	9:30 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.75640842	Latitude	34.45214946	
GPS HDOP		Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name	Cieneguitas Creek	Source:	1:24k USGS quad
Basin	East Fork Maria Ygnacio Creek	Quad Name (7.5')	GOLETA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Goleta

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population? Unknown

Source

Crossing Type

Crossing Type: Culvert ID:

General Description: Approx. 8 ft in diameter CMP culvert, stream is currently dry.

Photos

3.1 Upstream Looking Upstream - Photo I	SB_192_0.37_US_US
3.2 Upstream Looking Downstream - Photo I	SB_192_0.37_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_192_0.37_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_192_0.37_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 0.37**

Access Information

Land Ownership:

Upstream	public	Owner(s)	unknown
Downstream	public	Owner(s)	unknown

Accessible from road?

Upstream?	Yes	Limitations	none
Downstream?	Yes	Limitations	none

Vegetation Removal Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments minimal veg

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Maintenance Assistance Required?

Upstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Downstream? No (If "Yes", comment and take photograph)

Photo ID Comments

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 3.50**

Survey Information

Date	4/10/2017	**Time**	10:30 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.70595484	Latitude	34.44642025	
GPS HDOP		Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name: unknown Source:

Basin	Mission Canyon	Quad Name (7.5')	SANTA BARBARA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Santa Barbara

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	No

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population? Unknown

Source

Crossing Type

Crossing Type: Culvert ID:

General Description: Single CMP culvert approx. 2ft diameter. Greater than 20% gradient both upstream and downstream, dry up and downstream.

Photos

3.1 Upstream Looking Upstream - Photo I	SB_192_3.5_US_US
3.2 Upstream Looking Downstream - Photo I	SB_192_3.5_US_DS
3.3 Downstream Looking Upstream - Photo ID	not accessible
3.4 Downstream Looking Downstream - Photo ID	SB_192_3.5_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **No**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 5.40**

Survey Information

Date	4/10/2017	**Time**	11:00 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.68307401	Latitude	34.44715497	
GPS HDOP	1.46	Loc. of GPS Point		PM

Hydrologic Information

Stream Name: sycamore creek Source:

Basin	Sycamore Canyon	Quad Name (7.5')	SANTA BARBARA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Santa Barbara

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	No
Is the waterway a concrete-lined flood control channel?	No

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population? Unknown

Source

Crossing Type

Crossing Type: Bridge w/ potential passage constraints ID

General Description: upstream half of Bridge Stone Block, downstream half concrete - half concrete bottom, 1' fall to natural bottom, u/s, d/s wingwalls

Photos

3.1 Upstream Looking Upstream - Photo I	SB_192_5.40_US_US
3.2 Upstream Looking Downstream - Photo I	SB_192_5.40_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_192_5.40_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_192_5.40_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 5.40**

Access Information

Land Ownership:

Upstream	public	Owner(s)	unknown
Downstream	public	Owner(s)	unknown

Accessible from road?

Upstream?	Yes	Limitations	Steep slope down to creek, full of posion oak
Downstream?	Yes	Limitations	Steep slope down to creek, full of posion oak

Vegetation Removal Required?

Upstream?	Yes	(If "Yes", comment and take photograph)	
Photo ID	SB_192_5.40_US_US	Comments	poision oak
Downstream?	Yes	(If "Yes", comment and take photograph)	
Photo ID	SB_192_5.40_DS_DS	Comments	posion oak and shrubs/tree branches

Maintenance Assistance Required?

Upstream?	Yes	(If "Yes", comment and take photograph)	
Photo ID	SB_192_5.40(3)	Comments	blind corner
Downstream?	Yes	(If "Yes", comment and take photograph)	
Photo ID	SB_192_5.40(3)	Comments	blind corner, no shoulder very little space for total station

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	Yes
Can you see all the way through the end of the culvert?	Unknown
Can you feel a breeze through the culvert?	Unknown

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 6.41**

Survey Information

Date	4/10/2017	**Time**	11:30 (24 hr. clock)	**Agency Performing Survey**	HDR
Data Recorder	bonanian			Survey Team	BO, MC, DW

Site Information

GPS Data

Longitude	-119.66834545	Latitude	34.44302524	
GPS HDOP	3.94	Loc. of GPS Point	above inlet	PM

Hydrologic Information

Stream Name: Rattle Snake Creek? Source:

Basin	Sycamore Canyon	Quad Name (7.5')	SANTA BARBARA
USGS Hydrologic Unit	SANTA_BARBARA_COASTAL	CalWater Unit HA	South Coast
CalWater Unit HU	SOUTH COAST	CalWater Unit HSA	Santa Barbara

Natural Stream Channel?

Is there a definable channel upstream of culvert?	Yes
Is the primary function for storm water runoff or road drainage?:	Unknown
Is the waterway a concrete-lined flood control channel?	No

Potential Fish Bearing Stream?

Does the site contain an active channel width >2 feet?	Yes
Is the stream gradient < 20%?	Yes

Salmonid ESU/DPS

ESU (Chinook and Coho Salmon) or DPS (Steelhead)

Historic Anadromous Reach?

Has the stream reach upstream of the crossing supported an anadromous fish population? Unknown

Source: Calfish states "No"

Crossing Type

Crossing Type: Culvert ID:

General Description: Concrete/stone block box culvert/small bridge (app 20' in length) concrete bottom under bridge, private property downstream, upstream surveyable

Photos

3.1 Upstream Looking Upstream - Photo I	SB_192_6.41_US_US
3.2 Upstream Looking Downstream - Photo I	SB_192_6.41_US_DS
3.3 Downstream Looking Upstream - Photo ID	SB_192_6.41_DS_US
3.4 Downstream Looking Downstream - Photo ID	SB_192_6.41_DS_DS

Detailed Survey Required?

Detailed Survey Required?: **Yes**

Report Date 07-24-2017

RECONNAISSANCE SURVEY INFORMATION

County: SB **Route: 192** **PM: 6.41**

Access Information

Land Ownership:

Upstream	unknown	Owner(s)	unknown
Downstream	private	Owner(s)	unknown

Accessible from road?

Upstream?	Yes	Limitations
Downstream?	Yes	Limitations

Vegetation Removal Required?

Upstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments
Downstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments

Maintenance Assistance Required?

Upstream?	No	(If "Yes", comment and take photograph)
Photo ID		Comments
Downstream?	Yes	(If "Yes", comment and take photograph)
Photo ID	SB_192_6.41(2)	Comments: Possible private property, need landowner approval/confirmation

Confined Space Assessment

If answer is "No" to any of the questions below, site must have confined spaces equipment for surveying.
DO NOT ENTER CULVERT

Is culvert diameter > 60"?	No
Can you see all the way through the end of the culvert?	Yes
Can you feel a breeze through the culvert?	Yes

Report Date 07-24-2017

Appendix B – Fish Passage Assessment Photographs – Reconnaissance Surveys

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
Not Accessible	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Upstream looking upstream	Upstream looking downstream
	
Downstream looking upstream	**Downstream looking downstream**
	

Appendix C – Fish Passage Assessment Photographs – Detailed Surveys

Photo C-1. Downstream looking upstream at Sycamore Creek (Route 101, PM 12.34) no identifiable tailwater control.

Photo C-2. Mission Creek (Route 101, PM 13.96) tailwater control.

Photo C-3. Maria Ygnacio Creek (Route 101, PM 20.95) no tailwater control point; break in natural streambed channel downstream of crossing.

Photo C-4. San Jose Creek (Route 101, PM 21.63) tailwater control point downstream of crossing.

Photo C-5. Cieneguitas Creek (Route 192, PM 0.37) tailwater control point downstream looking upstream.

Appendix D – Detailed Fish Passage Assessment Site Sketches

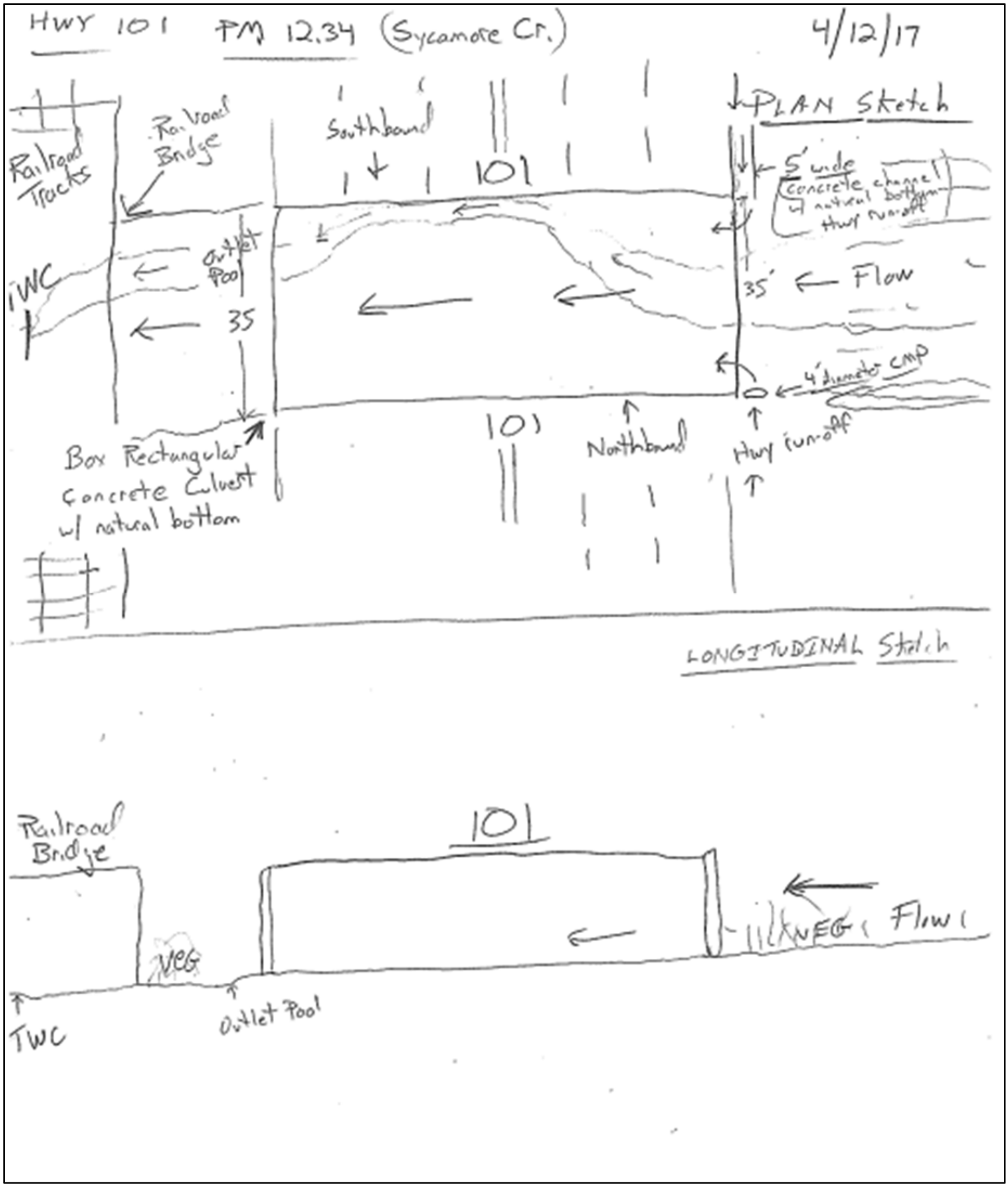

Figure D-1. Site sketch for Santa Barbara County, Route 101, PM 12.34.

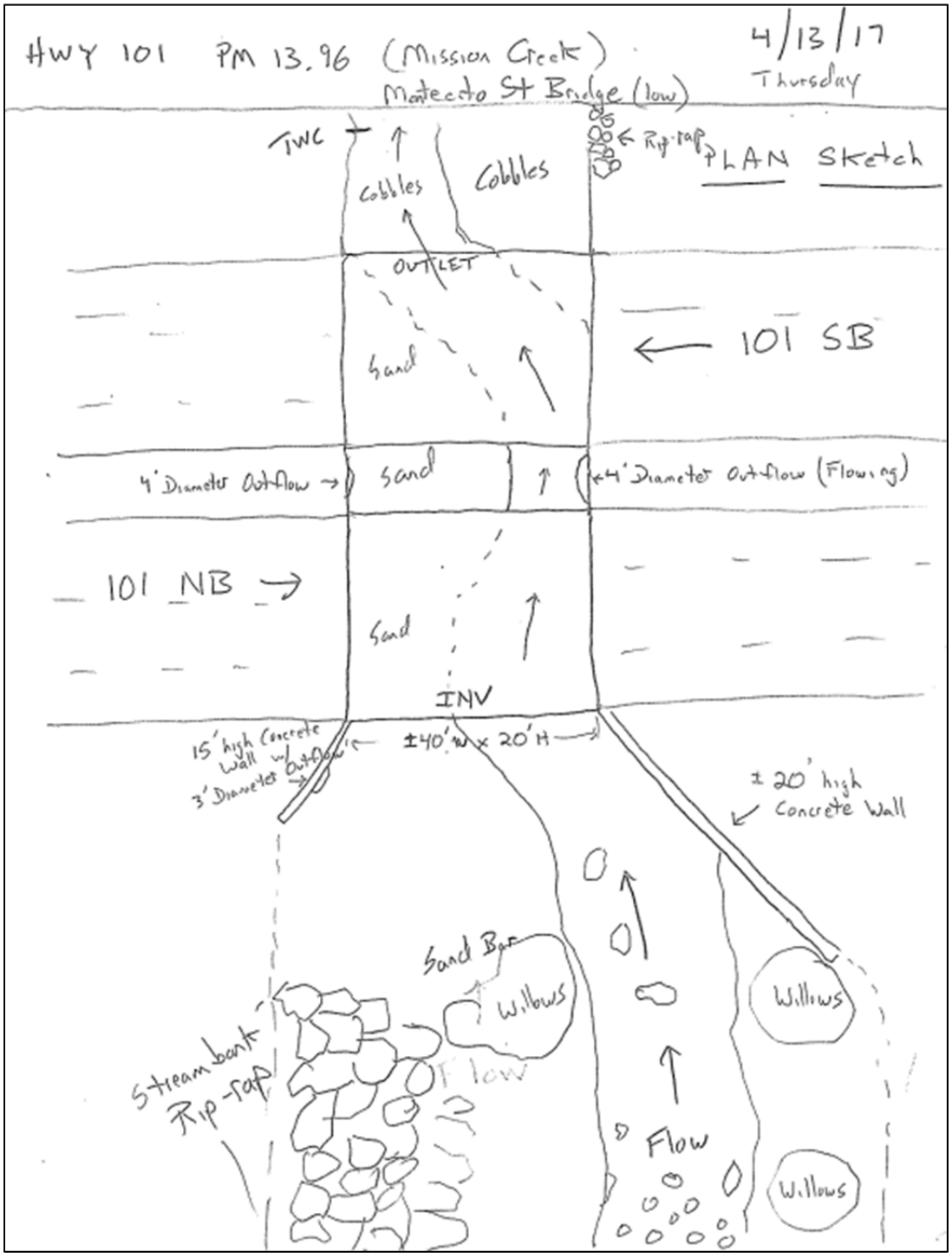

Figure D-2. Site sketch for Santa Barbara County, Route 101, PM 13.96.

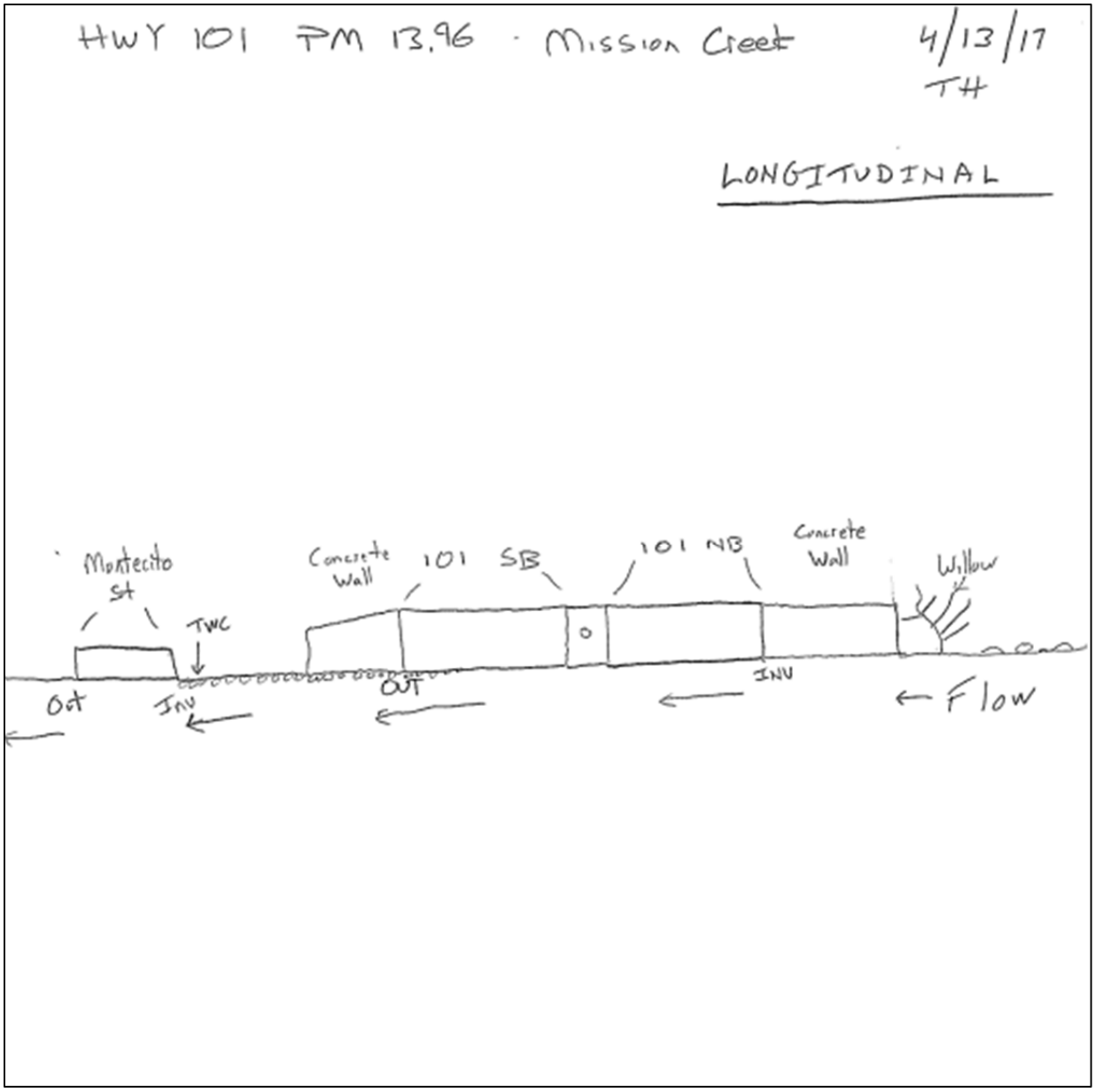

Figure D-3. Site sketch for Santa Barbara County, Route 101, PM 13.96.

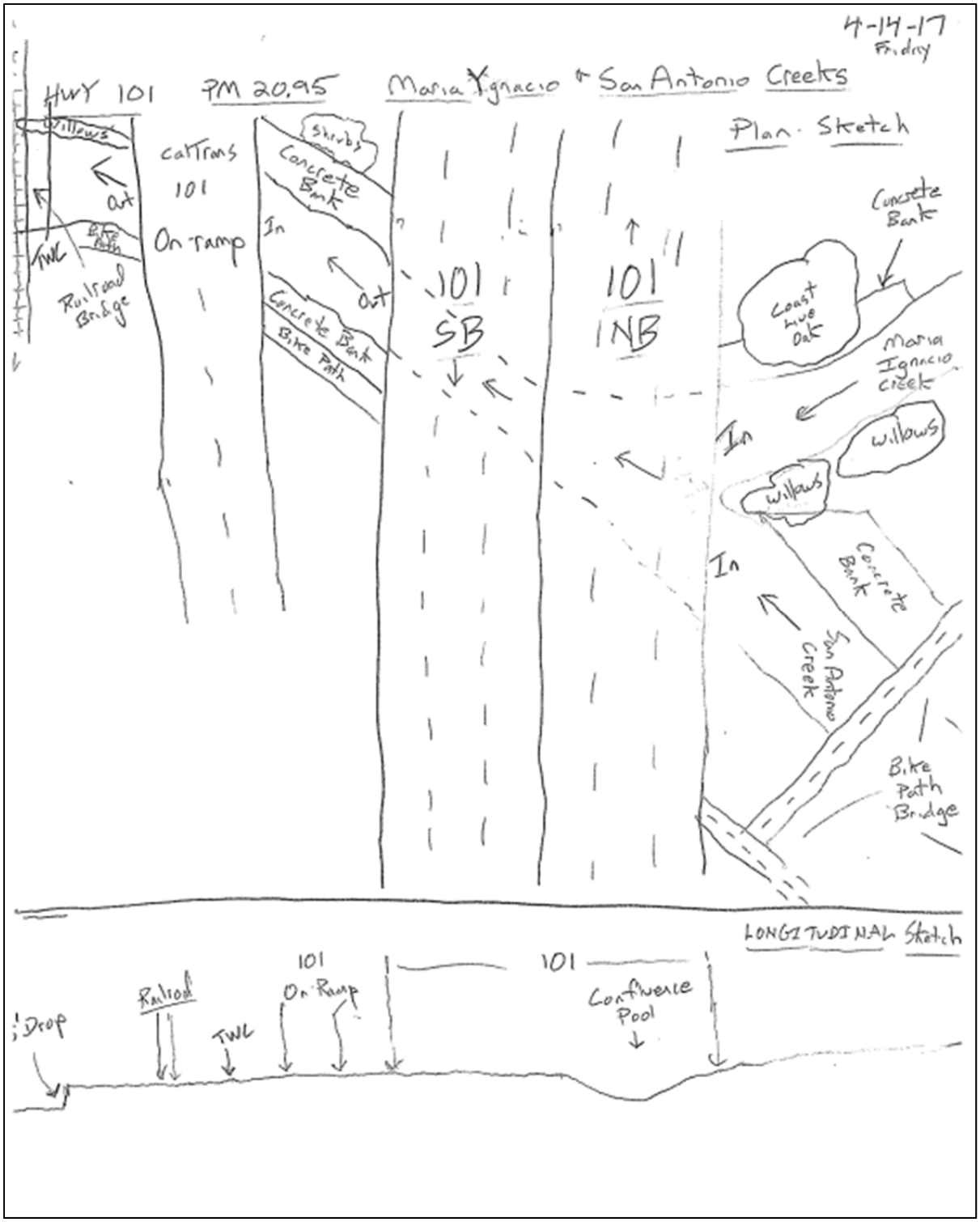

Figure D-4. Site sketch for Santa Barbara County, Route 101, PM 20.95.

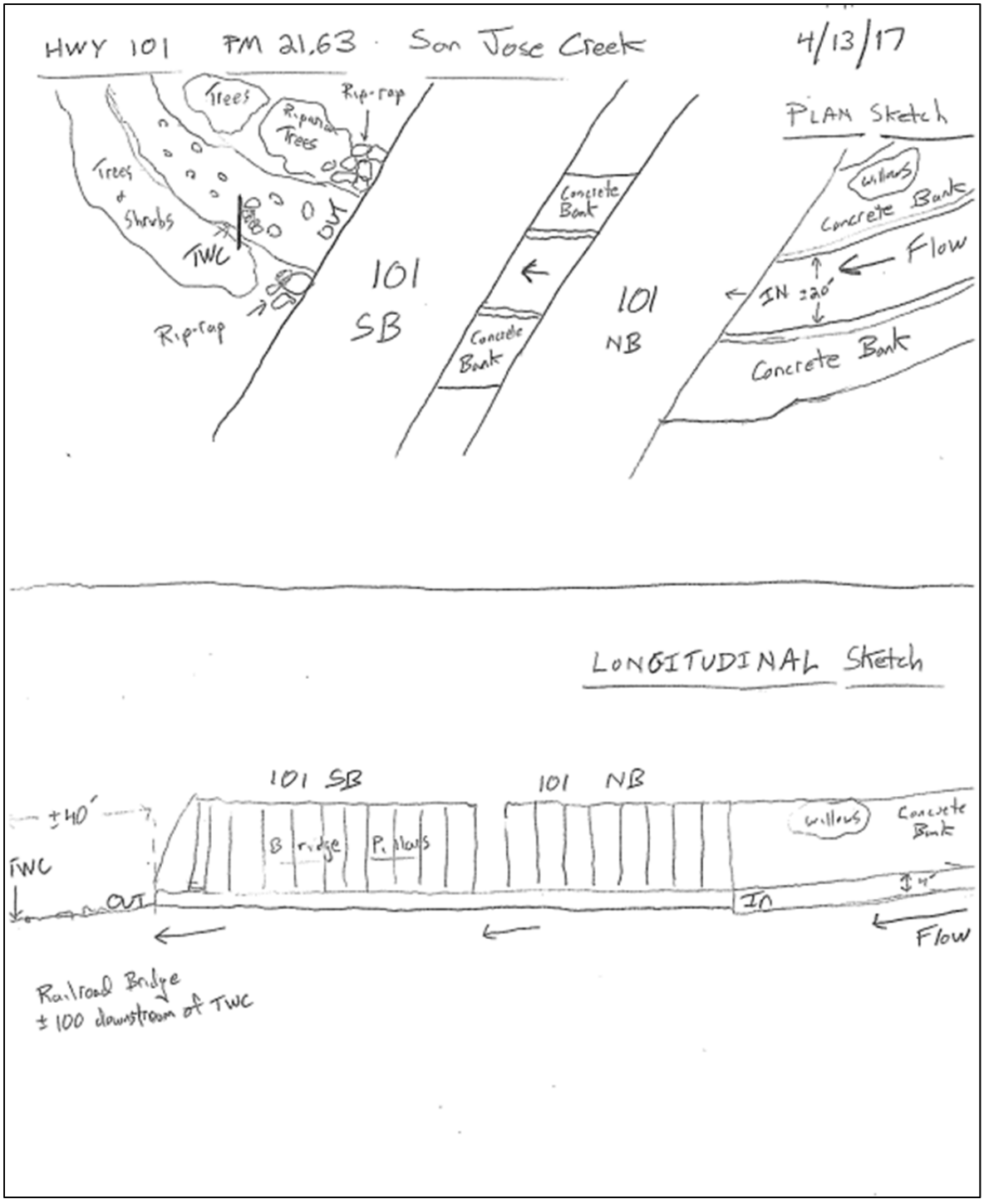

Figure D-5. Site sketch for Santa Barbara County, Route 101, PM 21.63.

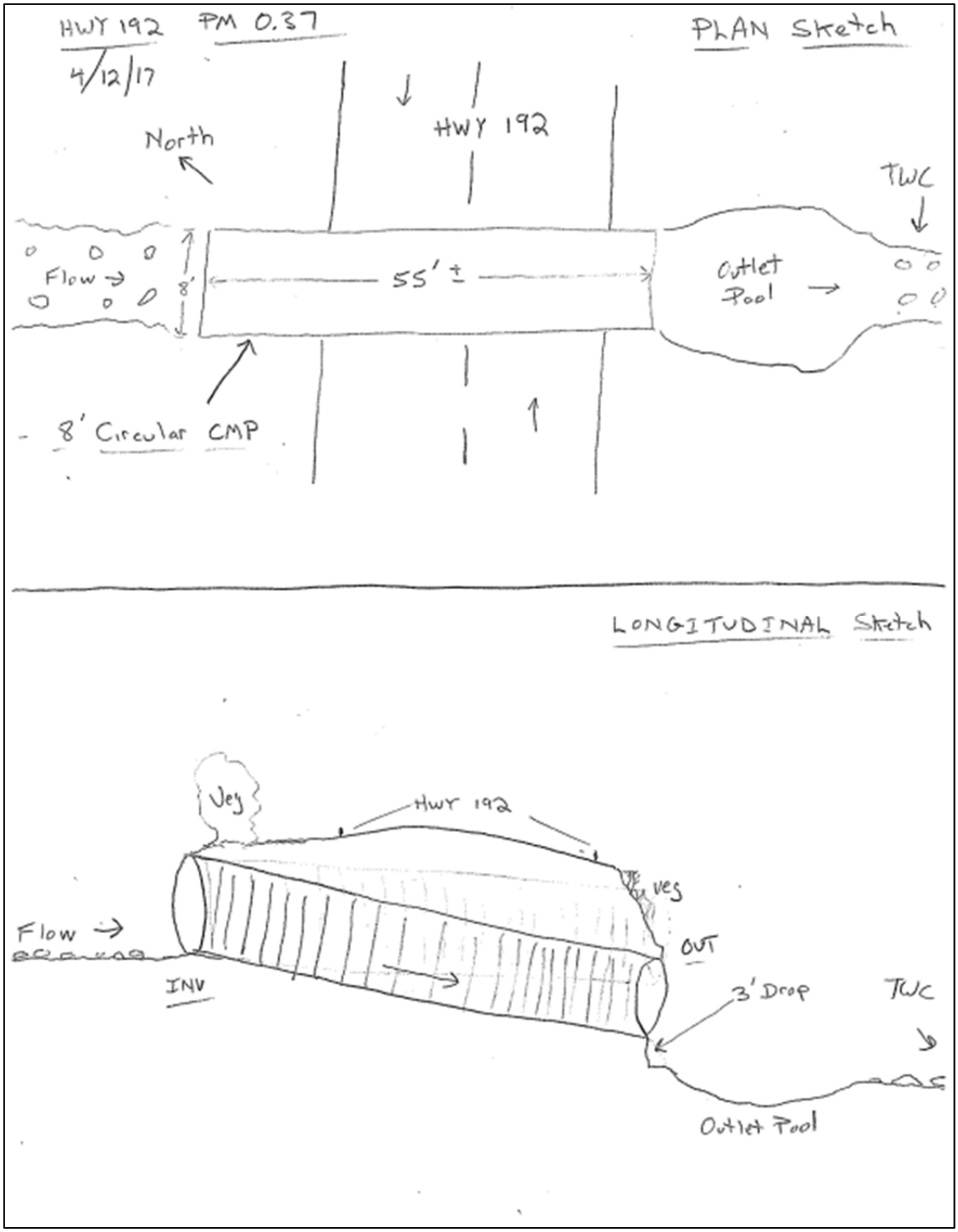

Figure D-6. Site sketch for Santa Barbara County, Route 192, PM 0.37.

Appendix E – Detailed Fish Passage Assessment Datasheets

Detailed Survey Information

GIS Number	SB	192	0.37

7 Surveyor Information

7.1 Date 4/12/2017 **Time** 8:00 **7.2 Agency** HDR

7.3 Scope B. Onanian 7.4 Rod M. Carbiener 7.5 Data D. Wappler

8 Crossing Information

Crossing Type Culvert No. of Culverts or Bays 1 No.of Segments 1 Type per Log CMP

9 Active Channel Width

9.1 Upstream Channel Widths: (1) 6.13 (2) 4.25 (3) 6.02

(4) 7.6 (5) 7.3

10 Trash Rack

10.1 Is there a trash rack present at the site? No

10.2 What is the distance upstream of trash rack from crossing?

10.3 Rack condition during survey

10.4 Flows at which trash rack is being bypassed

10.5 Elevation of the road prism
(assumes culvert inlet invert at 0.0 ft.)

10.6 Road fill volume

11 Tailwater Control Information

11.1 Natural Tailwater Control (downstream of weirs if present) Pool tail out

11.2 Tailwater Substrate Silt/Clay

12 Weir Presence and Description

12.1 Downstream weirs? ☐ 12.2 Number of weirs:

Weir Description

16 Site Pictures

Detailed Survey Information

GIS Number	SB	192	0.37

Culverts

Culvert Number 1

17 Embedded culvert (not including open arched culverts)

17.1 Is the culvert embedded? No

17.2 If YES, is it embedded:

17.3 Downstream End Depth (ft.)

17.3 Upstream End Depth (ft.)

17.4 Dominant Substrate

Detailed Survey Information

GIS Number	SB	192	0.37

Segments

Segment Number: 1

20 SEGMENT DESCRIPTION (describe any unique features of the segment)

Approx. 8 ft in diameter, single segment CMP.

21 SEGMENTShape Information

21.1 Segment Shape: Circular Pipe
21.2 Diameter (ft): 8
21.3 Height/Rise (ft):
21.4 Width/Span (ft):
21.5 Length (ft): 71.22
21.6 Culvert segment shape description (describe uniqueness of shape)

Approx. 8 ft in diameter, single segment CMP.

22 Mean Low Flow Indicator

22.1 Stain (rust) Line Height (ft)

23 Inlet information

23.1 Type:
23.2 Alignment (Inlet to Channel): > 45 Deg
23.3 Inlet description (describe apron type, shape, material and other features influencing fish passage):

Natural channel flowing into culvert, no concrete structure around culvert.

23.4 Inlet Apron: No
23.5 Inlet Apron Upstream Width (ft)
23.6 Inlet Apron Downstream Width (ft)
23.7 Inlet Apron Length (ft)
23.8 Inlet Apron Slope (%)

24 Outlet information

24.1 Type:
24.2 Alignment (Outlet to Channel): > 45 Deg
24.3 Outlet description (describe apron type, shape, material and other features influencing fish passage):

CMP culvert dropping approx. 5.3 ft into plunge pool.

24.4 Outlet Configuration: Freefall into pool
24.5 Fish ladder: no
24.6 Outlet Apron: No
24.7 Outlet Apron Upstream Width (ft)
24.8 Outlet Apron Downstream Width (ft)
24.9 Outlet Apron Length (ft)
24.10 Outlet Apron Slope

25 Segment side materials

25.1 Condition: Fair
25.2 Condition Description: CMP slightly rusted but seemed to be in fair condition, minor dents.
25.3 Side Material Description: Corrugated Metal Pipe
specify "other" side material:

26 Segment bottom/lining material

26.1 Condition: good
26.2 Condition description: CMP lining in good condition, little to no substrate inside.
26.3 Bottom/lining material description: Corrugated Metal Pipe
specify "other" bottom material:

27 Culvert segment retrofit

Detailed Survey Information

GIS Number	SB	192	0.37

27.1 Retrofit Type: None

27.2 Condition:

27.2 Outlet Sill?: No

Survey Results

CDFG Matrix Site Ranking

Active Channel Width (ft.)	6.260	(mean of 5 field measurements)
Maximum Slope (%)		(max. of collected data)
Baffles/Weirs?	0	

Residual Input/Output

Residual Inlet Depth (ft.)	
Residual Outlet Ddepth (ft.)	
Culvert #	1
Substrate Throughout?	No

Passage Evaluation For Site

Filter Result:	Red	Reason for Filter Result:	Active channel width greater than culvert width and greater than 2 foot outlet drop off.
Filter Results Adjusted?		Describe Adjustment:	

Fish Crossing Results for Site

Detailed Survey Information

GIS Number | **SB** | **101** | **12.34**

7 Surveyor Information

7.1 Date 4/12/2017 **Time** 10:50 **7.2 Agency** HDR

7.3 Scope B.Onanian 7.4 Rod M.Carbiener 7.5 Data D.Wappler

8 Crossing Information

Crossing Type Culvert No. of Culverts or Bays 1 No.of Segments Type per Log

9 Active Channel Width

9.1 Upstream Channel Widths: (1) 15.5 (2) 15.5 (3) 17.2

(4) 17.8 (5) 18.7

10 Trash Rack

10.1 Is there a trash rack present at the site? No

10.2 What is the distance upstream of trash rack from crossing?

10.3 Rack condition during survey

10.4 Flows at which trash rack is being bypassed

10.5 Elevation of the road prism
(assumes culvert inlet invert at 0.0 ft.)

10.6 Road fill volume

11 Tailwater Control Information

11.1 Natural Tailwater Control (downstream of weirs if present) No Control Point

11.2 Tailwater Substrate Sand (<0.08")

12 Weir Presence and Description

12.1 Downstream weirs? ☐ 12.2 Number of weirs:

Weir Description

16 Site Pictures

Detailed Survey Information

GIS Number	SB	101	12.34

Culverts

Culvert Number 1

17 Embedded culvert (not including open arched culverts)

17.1 Is the culvert embedded? Yes

17.2 If YES, is it embedded: Fully (entire culvert length)

17.3 Downstream End Depth (ft.)

17.3 Upstream End Depth (ft.)

17.4 Dominant Substrate Sand (<0.08")

Detailed Survey Information

GIS Number	SB	101	12.34

Segments

Segment Number: 1

20 SEGMENT DESCRIPTION (describe any unique features of the segment)

21 SEGMENTShape Information

21.1 Segment Shape: Box
21.2 Diameter (ft):
21.3 Height/Rise (ft): 6
21.4 Width/Span (ft): 35.5
21.5 Length (ft): 130.83
21.6 Culvert segment shape description (describe uniqueness of shape)
rectangular box culvert

22 Mean Low Flow Indicator

22.1 Stain (rust) Line Height (ft)

23 Inlet information

23.1 Type: Unknown
23.2 Alignment (Inlet to Channel): > 45 Deg
23.3 Inlet description (describe apron type, shape, material and other features influencing fish passage):
Concrete box culvert with no apron, headwall or wingwalls, channel running almost perpendicular to inlet.
23.4 Inlet Apron: No
23.5 Inlet Apron Upstream Width (ft)
23.6 Inlet Apron Downstream Width (ft)
23.7 Inlet Apron Length (ft)
23.8 Inlet Apron Slope (%)

24 Outlet information

24.1 Type:
24.2 Alignment (Outlet to Channel): > 45 Deg
24.3 Outlet description (describe apron type, shape, material and other features influencing fish passage):
Concrete box culvert with no apron, headwall or wingwalls, channel running almost perpendicular to outlet.
24.4 Outlet Configuration: At stream grade
24.5 Fish ladder: no
24.6 Outlet Apron: No
24.7 Outlet Apron Upstream Width (ft)
24.8 Outlet Apron Downstream Width (ft)
24.9 Outlet Apron Length (ft)
24.10 Outlet Apron Slope

25 Segment side materials

25.1 Condition: Good
25.2 Condition Description: Concrete in good condition
25.3 Side Material Description: Concrete Box
specify "other" side material:

26 Segment bottom/lining material

26.1 Condition: good
26.2 Condition description: Natural channel bottom.
26.3 Bottom/lining material description: Natural Substrate
specify "other" bottom material:

27 Culvert segment retrofit

Detailed Survey Information

GIS Number	SB	101	12.34

27.1 Retrofit Type: None

27.2 Condition:

27.2 Outlet Sill?: No

Survey Results

Upstream Channel Slope	0.40%	Road Width (ft)	
Downstream Channel Slope	1.00%	Road Fill Volume (cu ft)	
Inlet Fill Volume (cu ft)		Total Fill Volume (cu yd)	
Outlet Fill Volume (cu ft)		Elevation of Road Prism (ft)	

CDFG Matrix Site Ranking

Active Channel Width (ft.)	16.940	(mean of 5 field measurements)
Maximum Slope (%)	0.01	(max. of collected data)
Baffles/Weirs?	0	

Residual Input/Output

Residual Inlet Depth (ft.)	
Residual Outlet Ddepth (ft.)	
Culvert #	1
Substrate Throughout?	No

Passage Evaluation For Site

Filter Result:	Green	Reason for Filter Result:	Crossing width greater than active channel width, not constricting.
Filter Results Adjusted?		Describe Adjustment:	

Detailed Survey Information

GIS Number | **SB** | **101** | **13.96**

7 Surveyor Information

7.1 Date 4/13/2017 **Time** 9:30 **7.2 Agency** HDR

7.3 Scope B. Onanian 7.4 Rod M. Carbiener 7.5 Data D. Wappler

8 Crossing Information

Crossing Type Culvert No. of Culverts or Bays 1 No.of Segments 1 Type per Log

9 Active Channel Width

9.1 Upstream Channel Widths: (1) 19.1 (2) 20 (3) 22.6

(4) 25.2 (5) 23.9

10 Trash Rack

10.1 Is there a trash rack present at the site? No

10.2 What is the distance upstream of trash rack from crossing?

10.3 Rack condition during survey

10.4 Flows at which trash rack is being bypassed

10.5 Elevation of the road prism
(assumes culvert inlet invert at 0.0 ft.)

10.6 Road fill volume

11 Tailwater Control Information

11.1 Natural Tailwater Control (downstream of weirs if present) Pool tail out

11.2 Tailwater Substrate Cobble (2.5-10")

12 Weir Presence and Description

12.1 Downstream weirs? ☐ 12.2 Number of weirs:

Weir Description

16 Site Pictures

Detailed Survey Information

GIS Number	SB	101	13.96

Culverts

Culvert Number 1

17 Embedded culvert (not including open arched culverts)

17.1 Is the culvert embedded? Yes

17.2 If YES, is it embedded: Fully (entire culvert length)

17.3 Downstream End Depth (ft.)

17.3 Upstream End Depth (ft.)

17.4 Dominant Substrate Cobble (2.5-10")

Detailed Survey Information

GIS Number	SB	101	13.96

Segments

Segment Number: 1

20 SEGMENT DESCRIPTION (describe any unique features of the segment)

Open air in middle of box culvert, box culvert is the hwy 101 crossing over Mission Creek so openning between 101 S and 101 N

21 SEGMENTShape Information

21.1 Segment Shape: Box

21.2 Diameter (ft):

21.3 Height/Rise (ft): 15

21.4 Width/Span (ft): 25

21.5 Length (ft): 142.51

21.6 Culvert segment shape description (describe uniqueness of shape)

Concrete box culvert (hwy 101 crossing).

22 Mean Low Flow Indicator

22.1 Stain (rust) Line Height (ft):

23 Inlet information

23.1 Type:

23.2 Alignment (Inlet to Channel): > 45 Deg

23.3 Inlet description (describe apron type, shape, material and other features influencing fish passage):

Concrete headwall directing flow of creek under hwy 101 crossing, natural stream substrate.

23.4 Inlet Apron: No

23.5 Inlet Apron Upstream Width (ft):

23.6 Inlet Apron Downstream Width (ft):

23.7 Inlet Apron Length (ft):

23.8 Inlet Apron Slope (%):

24 Outlet information

24.1 Type: Headwall

24.2 Alignment (Outlet to Channel): > 45 Deg

24.3 Outlet description (describe apron type, shape, material and other features influencing fish passage):

Concrete headwall directing flow of creek under hwy 101 crossing, natural stream substrate.

24.4 Outlet Configuration: At stream grade

24.5 Fish ladder: no

24.6 Outlet Apron: No

24.7 Outlet Apron Upstream Width (ft):

24.8 Outlet Apron Downstream Width (ft):

24.9 Outlet Apron Length (ft):

24.10 Outlet Apron Slope:

25 Segment side materials

25.1 Condition: Good

25.2 Condition Description: Concrete in good condition.

25.3 Side Material Description: Concrete Box

specify "other" side material:

26 Segment bottom/lining material

26.1 Condition: good

26.2 Condition description: Natural stream substrate, not concrete lined.

26.3 Bottom/lining material description: Natural Substrate

specify "other" bottom material:

27 Culvert segment retrofit

Detailed Survey Information

GIS Number	SB	101	13.96

27.1 Retrofit Type: None

27.2 Condition:

27.2 Outlet Sill?: No

Survey Results

Upstream Channel Slope	1.00%	Road Width (ft)	
Downstream Channel Slope	0.00%	Road Fill Volume (cu ft)	
Inlet Fill Volume (cu ft)		Total Fill Volume (cu yd)	
Outlet Fill Volume (cu ft)		Elevation of Road Prism (ft)	

CDFG Matrix Site Ranking

Active Channel Width (ft.)	22.160	(mean of 5 field measurements)
Maximum Slope (%)	0.01	(max. of collected data)
Baffles/Weirs?	0	

Residual Input/Output

Residual Inlet Depth (ft.)	
Residual Outlet Ddepth (ft.)	
Culvert #	1
Substrate Throughout?	No

Passage Evaluation For Site

Filter Result:	Green	Reason for Filter Result:	Channel width greater than active channel width.
Filter Results Adjusted?		Describe Adjustment:	

Detailed Survey Information

GIS Number	SB	101	20.95

7 Surveyor Information

7.1 Date 4/14/2017 **Time** 8:15 **7.2 Agency** HDR

7.3 Scope B. Onanian 7.4 Rod M. Carbiener 7.5 Data D. Wappler

8 Crossing Information

Crossing Type: Bridge w/ potential passage constraints | No. of Culverts or Bays | No.of Segments: 2 | Type per Log

9 Active Channel Width

9.1 Upstream Channel Widths: (1) 22.5 (2) 16.5 (3) 13.9 (4) 15.5 (5) 16

10 Trash Rack

10.1 Is there a trash rack present at the site? No

10.2 What is the distance upstream of trash rack from crossing?

10.3 Rack condition during survey

10.4 Flows at which trash rack is being bypassed

10.5 Elevation of the road prism (assumes culvert inlet invert at 0.0 ft.)

10.6 Road fill volume

11 Tailwater Control Information

11.1 Natural Tailwater Control (downstream of weirs if present) No Control Point

11.2 Tailwater Substrate Bedrock

12 Weir Presence and Description

12.1 Downstream weirs? ☐ 12.2 Number of weirs:

Weir Description

16 Site Pictures

Culverts

Survey Results

CDFG Matrix Site Ranking

Active Channel Width (ft.)	16.880	(mean of 5 field measurements)
Maximum Slope (%)		(max. of collected data)
Baffles/Weirs?	0	

Residual Input/Output

Detailed Survey Information

GIS Number	SB	101	20.95

Passage Evaluation For Site

Filter Result:	Green	Reason for Filter Result:	Bridge width is greater than active channel width.
Filter Results Adjusted?		Describe Adjustment:	

Fish Crossing Results for Site

Detailed Survey Information

GIS Number	SB	101	21.63

7 Surveyor Information

7.1 Date 4/13/2017 **Time** 14:30 **7.2 Agency** HDR

7.3 Scope B. Onanian 7.4 Rod M.Carbiener 7.5 Data D. Wappler

8 Crossing Information

Crossing Type: Bridge w/ potential passage constraints | No. of Culverts or Bays | No.of Segments: 2 | Type per Log

9 Active Channel Width

9.1 Upstream Channel Widths: (1) 18.2 (2) 18.2 (3) 18.2 (4) 18.2 (5) 18.2

10 Trash Rack

10.1 Is there a trash rack present at the site? No

10.2 What is the distance upstream of trash rack from crossing?

10.3 Rack condition during survey

10.4 Flows at which trash rack is being bypassed

10.5 Elevation of the road prism (assumes culvert inlet invert at 0.0 ft.)

10.6 Road fill volume

11 Tailwater Control Information

11.1 Natural Tailwater Control (downstream of weirs if present) Unknown

11.2 Tailwater Substrate Cobble (2.5-10")

12 Weir Presence and Description

12.1 Downstream weirs? ☐ 12.2 Number of weirs:

Weir Description

16 Site Pictures

Culverts

Survey Results

CDFG Matrix Site Ranking

Active Channel Width (ft.)	18.200	(mean of 5 field measurements)
Maximum Slope (%)		(max. of collected data)
Baffles/Weirs?	0	

Residual Input/Output

Detailed Survey Information

GIS Number	SB	101	21.63

Passage Evaluation For Site

Filter Result:	Green	Reason for Filter Result:	Inlet width equal to the active channel width, channel is constrained by contrete wall
Filter Results Adjusted?		Describe Adjustment:	

Fish Crossing Results for Site