

Witecki, Matt

From: Ruth, Kerry
Sent: Wednesday, September 23, 2009 10:15 AM
To: Witecki, Matt
Subject: Re: Spring Cr. Hyd. Summary

Thank you Matt. Great write-up.

From: Witecki, Matt
To: Ruth, Kerry
Cc: Hansen, Erik (NW-Hydraulics&WQ); Ruth, Kerry; Walgamott, Erik; Hall, Kevin
Sent: Tue Sep 22 13:19:53 2009
Subject: RE: Spring Cr. Hyd. Summary

Kerry,
After looking thru this material, I would agree that these proposed weirs are not the best solution for this site. There are a great number of risks that could be directly associated with this artificial raising of the stream profile by the use of the 8 concrete weirs. The calculations show that the properly designed weirs (Elevation 117.60), which meet all the necessary fishery criteria would have a definite potential to impact the drainage facilities for the mall, the highway and the surrounding areas. These impacts could occur with fairly low design flows, and they would certainly occur with the 25 year and the 100 year flows, as shown by the calculations. Flows greater than the 100 year are also possible for this location and these weirs will cause far more flood damage than the level of risk currently at this site. While I strongly believe that a set of weirs could help solve fish passage barriers in general, I do not believe that this site is a good candidate for this approach.

Taking into consideration the high value of this land, the complexity of analysis and the conflict between fishery needs and the needs for the local drainage, I believe that we should seek a different solution for this site, that does not involve raising the profile of the stream.

Matthew J. Witecki, P.E., H.E.
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Washington State Department of Transportation
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Secretary: Stephanie Jensen 360-705-7235

From: Hall, Kevin
Sent: Friday, September 11, 2009 1:04 PM
To: Witecki, Matt
Cc: Hansen, Erik (NW-Hydraulics&WQ); Ruth, Kerry; Walgamott, Erik
Subject: FW: Spring Cr. Hyd. Summary
Importance: High

9/23/2009

Matt,

I have converted the draft report to electronic format. Three of the pages are 11 x 17 and did not scan correctly in the "full text" file and are attached in the second file.

Kevin Hall, PE

WSDOT Northwest Region

Hydraulic Office

Schedule: M-Th 6:30 AM - 5:00 PM

MS 138

E-mail: [<mailto:hallk@wsdot.wa.gov>](mailto:hallk@wsdot.wa.gov)

(206) 440-4903

Fax (206) 440-4805

From: Ruth, Kerry

Sent: Thursday, September 10, 2009 4:43 PM

To: Damitio, Chris; Carey, Scott

Cc: Drye, Jay; Hansen, Erik (NW-Hydraulics&WQ); Soicher, Alan; Martinez, Christina; Hall, Kevin

Subject: RE: Spring Cr. Hyd. Summary

Importance: High

All,

Given what the implications of this memo will mean, Jay and I would like to have a 3rd set of eyes review this memo to ensure we are heading down the right path before we elevate this to WDFW management.

Therefore, these are the next steps I would like to take:

1. Send NWR Hydraulics analysis to Matt Witecki's team for review (Erik to submit to Matt on Monday)
2. Contact WDFW Don Ponder and verify analysis assumptions are accurate (Erik to contact Don Ponder on Monday)
3. Review Letter from Megan White to Greg Hueckel regarding Spring Creek (All to provide review comments to Scott AFTER steps 1 and 2 above have been completed)

I do not see the need to rush ourselves through this determination. It is in our best interest to be 100% sure that we have HQ support in our determination that this mitigation can not be constructed. Therefore, I want to ensure that Matt Witecki concurs with our direction and that WDFW does as well (at a staff level). I apologize if we have elevated this to early to HQ without having completed these checks and balances. However, this will help ensure we have 100% confidence level in our determination. This is particularly important given the culvert lawsuit.

Any questions, let me know. Otherwise, I would expect to have HQ review on this within a few weeks and then Megan can send the letter by the end of this month. If this does not work timeline, please let me know.

Thank you,
Kerry

From: Damitio, Chris

Sent: Thursday, September 10, 2009 11:52 AM

To: Carey, Scott

Cc: Drye, Jay; Hansen, Erik (NW-Hydraulics&WQ); Soicher, Alan; Ruth, Kerry

Subject: Spring Cr. Hyd. Summary

Scott,

9/23/2009

Attached is our summary of the Spring Creek Hyd. analysis. Thanks for your patience and let me know if you need further.

CHRIS 788-7403

9/23/2009



August 5, 2009

TO: Chris Damitio/Claton Luce
(360) 788-7403/(360) 788-7417 NB-82, MS 55

FROM: Erik M. Hansen /Yared Bereded-Samuel
(206) 440-5076 / (206) 440-4601 NB-82, MS 138

SUBJECT: SR 539 MP 0.01 to MP .03 XL 3279
Spring Creek Fish Passage Retrofit
Draft Hydraulic Summary Transmittal

The above draft hydraulic summary was written by Yared Bereded-Samuel of the Northwest Region Hydraulics Office, reviewed and stamped by Erik M. Hansen of the same office. As a result of these actions the report has been found to contain the appropriate elements required by the WSDOT's *Hydraulic Manual* (HM), and *Highway Runoff Manual* (HRM).

A final report will be submitted after verification of the data needed for the completion of the fish passage retrofit design.

If you have any questions regarding this report, please contact Yared Bereded - Samuel at (206) 440-4601.

EMH: ybs

cc: Day file
Hyd./WQ Project Files MS 138

HYDRAULIC SUMMARY

SR 539

Spring Creek – Fish Passage Retrofit
MP 0.01 TO MP 0.03

XL-3279, PIN A53900H

DRAFT

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Northwest Region
Seattle, Washington

This report was prepared by Yared Bereded-Samuel under my direct supervision as defined in WAC 196-23-030.

Erik M. Hansen, P.E.
HRM Certificate # 1363
Project Engineer

DRAFT

Lorena Eng, P.E.
Region Administrator

July 2009

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	WEIR DESIGN-UPPER BOUND FISH PASSAGE FLOW
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	- UPPER BOUND FISH PASSAGE FLOW WEIR
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A6	CORRESPONDANCE WITH WDFW
A7	SINK HOLE REPAIR CORRESPONDANCES

DRAFT

SR Spring Creek Twin Culverts Fish Passage Retrofit Design.

By Yared Bereded-Samuel
NW Region Hydraulics Office
07/28/09

Background

The Spring Creek Twin Culverts were identified as fish barrier culverts due to their potential low flow depth and high velocity. WSDOT agreed to remove these barriers by installing concrete weirs in the downstream channel per the Settlement Agreement dated October 24, 2007 (See copy of agreement in appendix A6).

The NW Region Hydraulic Office performed the following hydraulic analysis to assess the impact of installing weirs in the downstream channel, on the conveyance capacity of the existing culverts and the potential flooding due to the backwatering of Spring Creek and other portions of this system.

Analysis Approach

Three scenarios were considered:

1. Existing conditions
2. Weirs heights that satisfy fish passage criteria for the median flow were determined using the regression equation.
3. Weirs heights that satisfy fish passage criteria for the upper bound flow were determined using the regression equation (median flow + standard error).

To determine the weir heights for scenarios 2 and 3, FishXing version 3 software (a free software sponsored by FHWA, US Fish and Wildlife and others) was used. For backwater analysis HEC-RAS was used.

The 25-year and 100-year return frequency peak flows were determined using USGS StreamStats online calculation.

Fish passage design flows were determined using Equation 1 in Chapter 5 of "*Design of Road Culverts for Fish Passage, 2003*", a WDFW manual.

Existing site conditions

At the outlet location of the Spring Creek Twin Culverts, there are 6 other pipes draining into the same plunge pool where the Twin Culverts are discharging (see Fig 1). These are:

1. A 6" CMP pipe appears abandoned.
2. A 63' long 8" PVC pipe with an outlet invert elevation of 119.08 is connected to CB #4 with a rim elevation of 122.33 located in the northwest corner of the SR 539 and Bellisfair Parkway intersection.

3. A 180' long 36" culvert which conveys the North Fork Baker Creek with a drainage area of 1.21 sq miles. At the inlet side there are two structures, MH#1 with a rim elevation of 124.20 and CB #5 with a rim elevation of 123.58.
4. A 70' long 24" culvert which conveys a tributary flow to the North Fork Baker Creek with a drainage area of 0.41 sq miles. Upstream of this culvert, there is a privately owned constructed stormwater wetland / (detention pond?).
5. A 9' long 8" PVC pipe draining Bellisfair Parkway roadway runoff. The outlet invert elevation is 119.47 and the inlet CB #1 rim elevation is 121.30.
6. A 35' long 8" PVC pipe with an outlet invert elevation of 116.69 is connected to CB #2 located on the south side of the Bellisfair Parkway with a rim elevation of 122.17. This CB is connected to a 52' long 8" PVC pipe that is connected to CB #3 with a rim elevation of 122.14, located on the north side of the same street.

Upstream of the Spring Creek Culverts bank overtopping has been estimated to start at elevation 123.23 feet (adjusted for WSDOT's datum). This was determined by Don Ponder (WDFW) in his January 10, 2007 memo to Chris Detrick by adding 30" to the crown elevation to the right bank culvert inlet. i.e. $116.23 + 4.5 + 2.5 = 123.23$) see Fig 2 point D. If overtopping occurs the adjacent strip mall area will be flooded.

Upstream of the North Fork Baker Creek Tributary Culvert the lowest elevation of the pond bank is 123.07 feet (Fig 3). Therefore, flooding will occur above this elevation. Any backwatering into the existing pond will affect the functionality of the pond and also may create a liability to WSDOT for any property damage and/or environmental impacts due to the flooding.

In the vicinity of the North Fork Baker Creek inlet, the rim elevation of CB #5 (Fig 3) located on the west side of SR 539 is 123.58 feet. Overflow through this CB may flood SR 539.

Proposed site conditions

A series of concrete weirs will be installed in the Lower Reach of North Fork Baker Creek. The first weir will be installed 30 feet from the outlet of the Spring Creek Twin Culverts. The weirs will have 0.5 feet deep V-notch in the middle. The invert elevation of the V-notch is determined to meet the required depth and velocity criteria at the fish passage flow(see WSDOT Culvert Scoping Report in Appendix A6 for details). In order to determine this elevation two scenarios were investigated: The median fish passage flow and the upper bound fish passage flow were determined using WDFW's manual. "*Design of Road Culverts for Fish Passage, 2003*", Chapter 5, Equation 1.

Summary of analysis results.

The median fish passage flow is 22.67 cfs with a flow range of 11.65 cfs to 33.68 cfs. For the 22.67 cfs the first weir v-notch invert elevation should have a minimum elevation of

117.10 to meet both depth and velocity criteria. For the upper bound fish passage flow, 33.68 cfs, the first weir v-notch invert elevation should have a minimum elevation of 117.60 to meet both depth and velocity criteria.

The backwater impact of setting the first weir height was checked with HEC-RAS analysis. The headwater elevations at the inlet of the culverts for Q_{25} and Q_{100} are as follows:

At Q_{25}

- | | <u>Inlet HW elevation</u> | <u>What Occurs</u> |
|---------------------------------------|---------------------------|-------------------------|
| • No weir (existing Condition) | | |
| ○ Spring Creek Twin Culverts | 120.03 ⁵⁰ | No overtopping |
| ○ North Fork Baker Creek | 123.23 | No overtopping |
| ○ North Fork Baker Creek Tributary | 121.1 | No overtopping |
| • First weir elevation at 117.10 feet | | |
| ○ Spring Twin Culverts | 120.54 | No overtopping |
| ○ North Fork Baker Creek | 123.23 | No overtopping |
| ○ North Fork Baker Creek Tributary | 121.37 | Impact on pond function |
| • First weir elevation at 117.60 feet | | |
| ○ Spring Twin Culverts | 121.12 | No overtopping |
| ○ North Fork Baker Creek | 123.23 | No overtopping |
| ○ North Fork Baker Creek Tributary | 121.93 | Impact on pond function |

At Q_{100}

- | | | |
|---------------------------------------|--------|-------------------------|
| • No weir (existing Condition) | | |
| ○ Spring Twin Culverts | 121.41 | No overtopping |
| ○ North Fork Baker Creek | 124.07 | Overtopping @CB#5 |
| ○ North Fork Baker Creek Tributary | 122.03 | Impact on pond function |
| • First weir elevation at 117.10 feet | | |
| ○ Spring Twin Culverts | 121.25 | No overtopping |
| ○ North Fork Baker Creek | 124.07 | Overtopping @CB#5 |
| ○ North Fork Baker Creek Tributary | 122.05 | Impact on pond function |
| • First weir elevation at 117.60 feet | | |
| ○ Spring Twin Culverts | 122.00 | No overtopping |
| ○ North Fork Baker Creek | 123.93 | Overtopping @CB#5 |
| ○ North Fork Baker Creek Tributary | 122.13 | Impact on pond function |

Conclusion

The installation of the weirs will impact the functionality of the 24" culvert and impact the privately owned pond at Q_{25} flow. There appears no flooding or bank overtopping upstream of the Spring Creek Twin Culverts. At this time we do not have information on

the bank elevation of the upstream section of the North Fork Baker Creek. If there are locations which are lower than elevation 123.23, these locations will be points of overflow at Q_{25} flow.

We recommend that additional survey information should be collected and the analysis should be refined before we proceed with the fish passage retrofit design. The cost of mitigation for the impact the weirs impose and the fact that the retrofit is considered to be a temporary solution warrants revisiting the scope of this project.



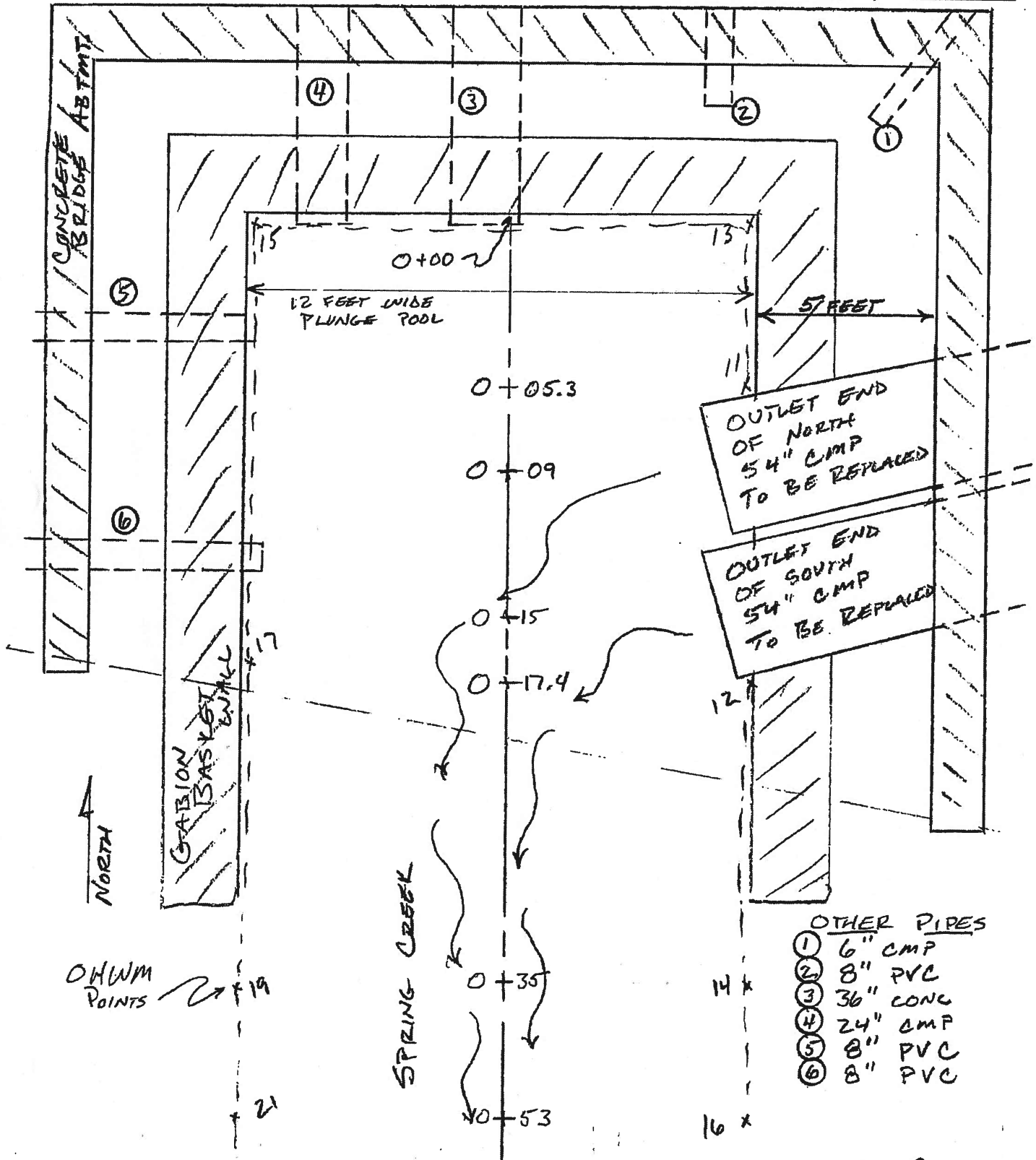
Washington State
Department of Transportation

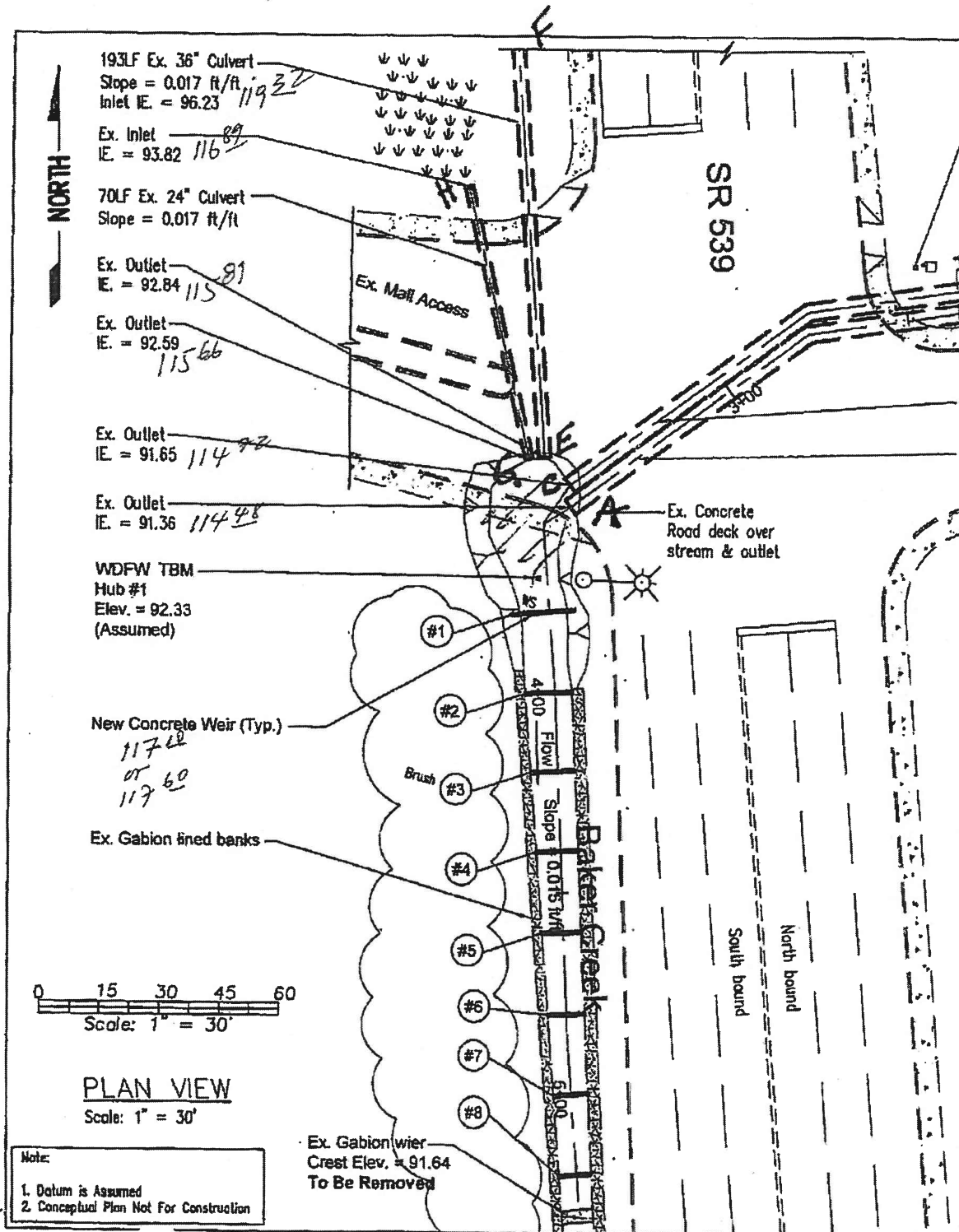
Design Calculations Materials Laboratory

Project SR 539 - BELLIS FAIR SINKHOLE

Sheet No. 3 of 4 Sheets

S.R. 539 Made by J. PETERSON Checked by _____ Date _____ Supv. _____





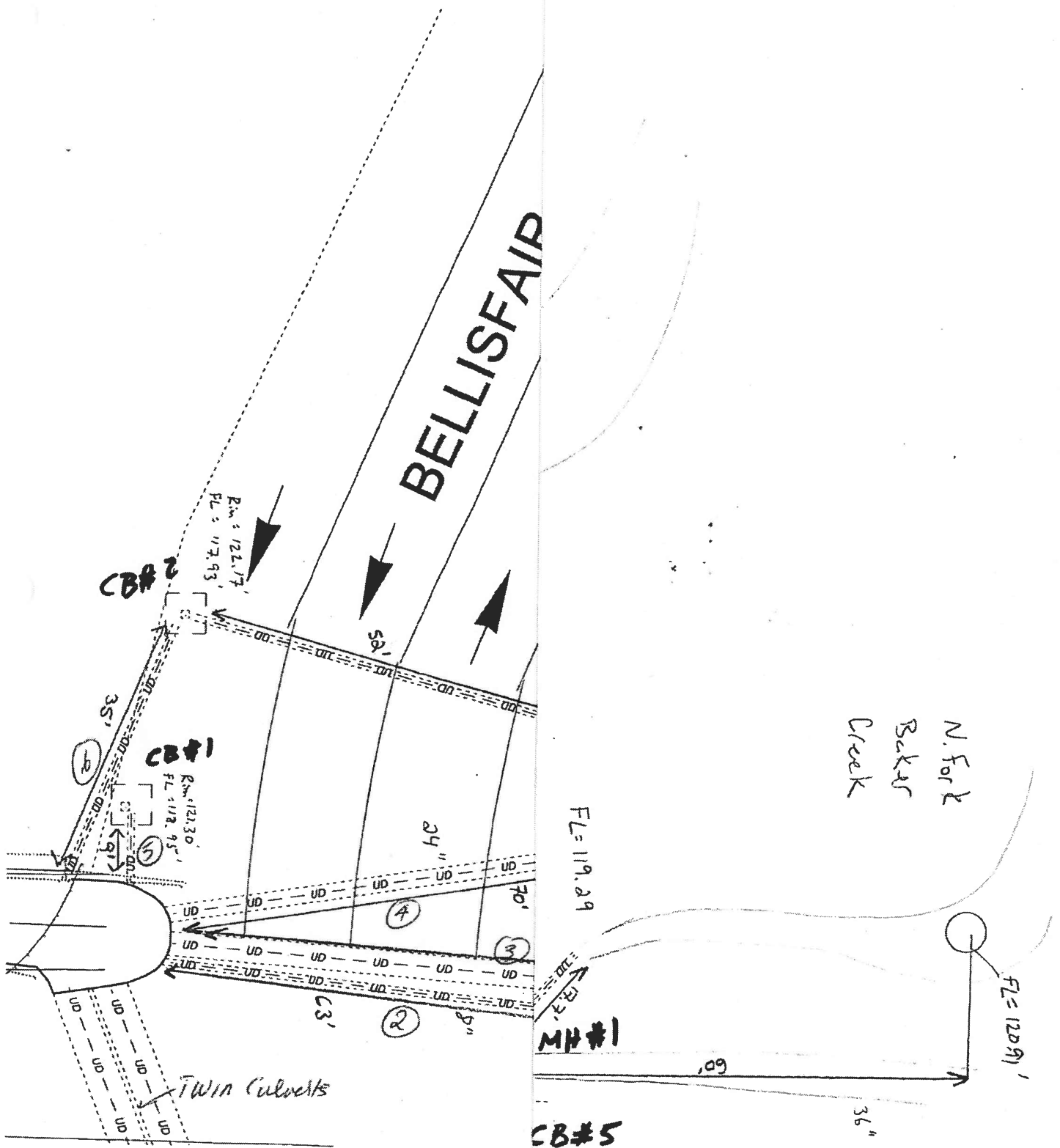


FIG 3

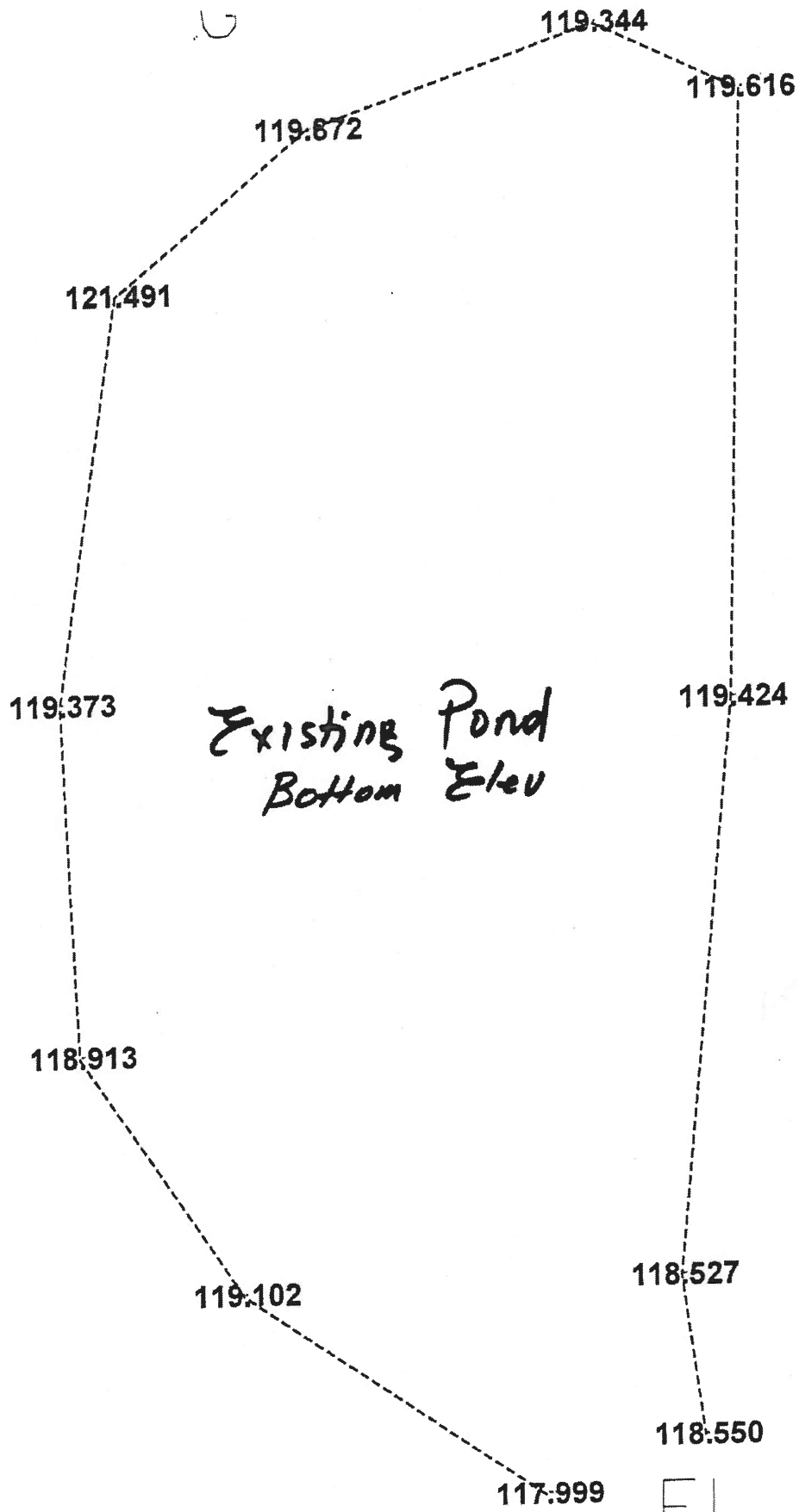


FIG 4

Fig 2

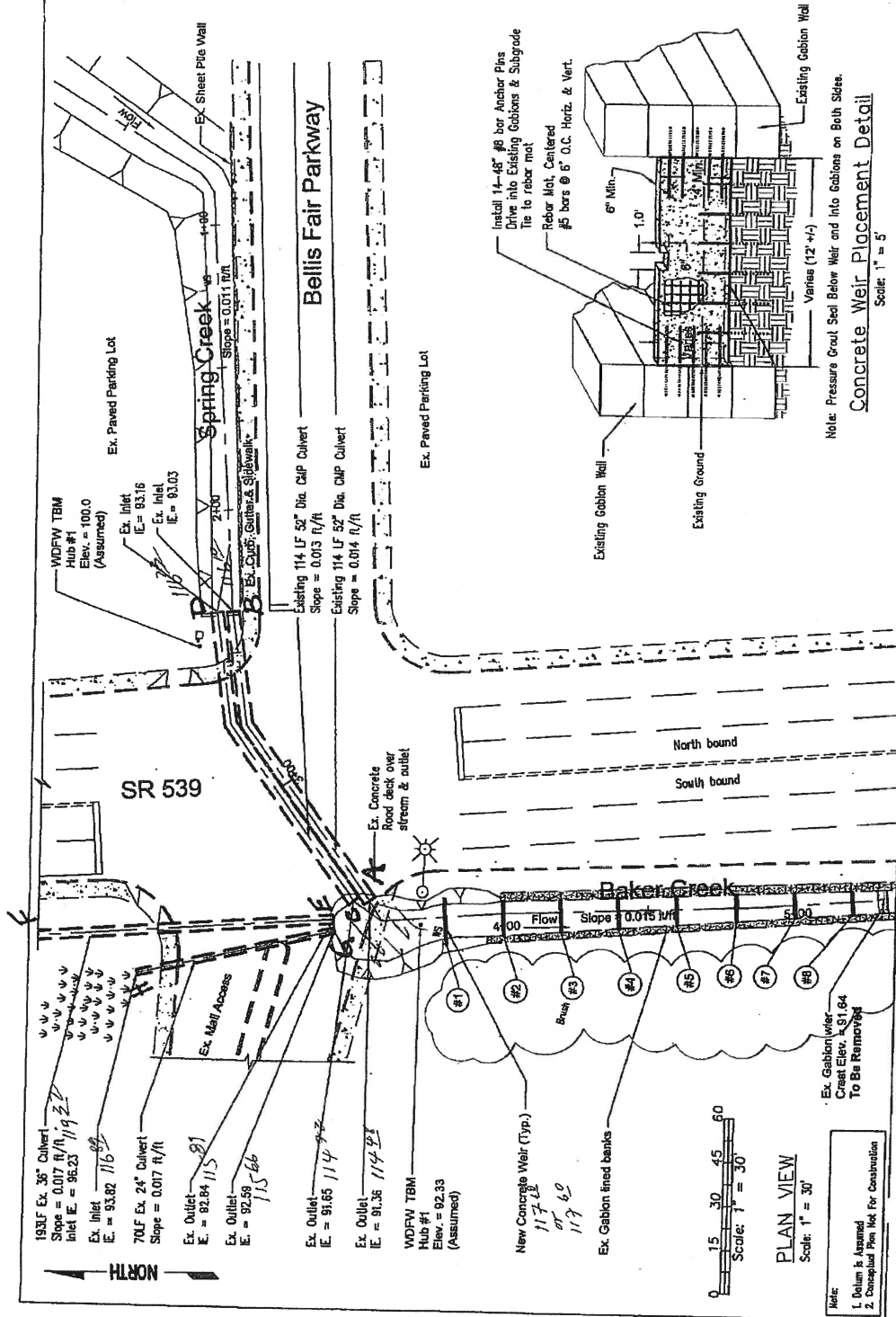


Project: State Route 539 Mile Post 0.31
 Engineer: D. Ponder
 Subject: Conceptual Plan
 Drawn by: K. Corwin

Site: 990015

Date: 9-22-06

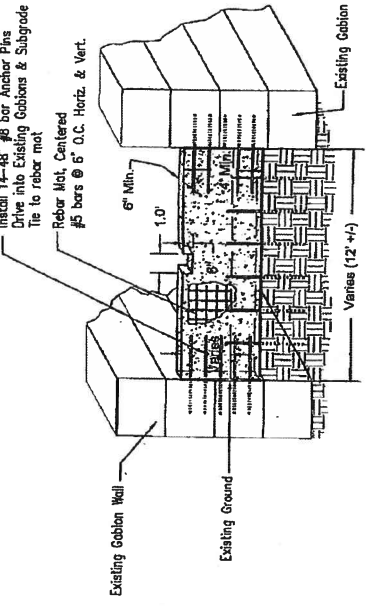
Sheet 2 of 3



Concrete Weir Placement Detail

Scale: 1" = 5'

Note: Pressure Grout Seal Below Weir and into Gabions on Both Sides.



PLAN VIEW

Scale: 1" = 30'

Note:
 1. Datum is Mean Sea Level
 2. Conceptual Plan Not For Construction

FIG 3

