



STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
Stream Protection and Management Branch

FIELD INVESTIGATION REPORT
FI2010020201 (East Maui, Diversions)

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|-------------------------------------|---|------------------------|-------------|
| Date of Field Investigation: | February 2, 2010 | Time (24-hour): | 0630 - 1630 |
| CWRM Staff: | Dean Uyeno, Diane England, and Chui Ling Cheng | | |
| Individuals Present: | DAR Staff – Lance Nishiura EMI Staff – Garret Hew, Mark Vaught, Henry Robello | | |
| Hydrologic Unit: | East Maui | | |
| Stream Name: | Multiple Streams | | |
| Findings: | <p>Staff arrived in Maui at 0630 hours.</p> <p>The purpose of this field visit was to document the physical dimensions of and how water flows past the EMI diversion structures in 17 petitioned streams in east Maui. The streams include Alo, Waikamoi, Wahinepee, Puohokamoa, Haipuaena, Pnalau/Kolea, Honomanu, Nuaailua, West Wailuaiki, East Wailuaiki, Kopiliula, Waiohue, Paakea, Waiaaka, Kapaula, Hanawi, and Makapipi. Documentation was completed in three days. The following is a list of streams and the respective diversions that staff visited on the first day of the field visit.</p> <ol style="list-style-type: none"> 1. Makapipi Stream, K-1 intake into Koolau Ditch. Diversion structure consists of a 15 feet (L) x 5 feet (H) dam. Intake and sluice gate (3 x 1.83 feet, W x H) situate on the left bank. Water flows down a small waterfall before reaching the diversion. Makapipi Stream had ponded water downstream of the diversion. 2. Hanawi Stream, K-4 intake into Koolau Ditch. Diversion structure consists of a 38 feet (L) dam. Intake and sluice gate (2.97 x 4 feet, W x H) situate on the right bank, with the intake grate about 30 feet upstream of the sluice gate. Minor diversion on the right bank consists of 2 white pipes that transmit seepage flow into the gravel basin. Water flows down a waterfall before reaching the diversion. Hanawi stream was flowing downstream of the diversion, mostly likely a result of the open sluice gate at the time of the visit. 3. Kapaula Stream, K-7 intake into Koolau Ditch. Diversion structure consists of a 19.5 feet (L) x 2.7 feet (H) dam. Intake grate (3 x 19 feet, W x L) situates on the right bank with no sluice gate. Water flows down a small cascading waterfall before reaching the diversion. Downstream of the diversion appears to have an existing diversion dam. According to Garret Hew, the stream is losing upstream of the old dam. Therefore, the diversion dam was moved further upstream from the losing section. 4. Waiaaka Stream, K-9 intake into Koolau Ditch. Waiaaka Stream is used to convey water from a development tunnel into the Koolau Ditch. The stream was dry downstream from the diversion. No physical measurements were recorded. 5. Paakea Stream, K-10 intake into Koolau Ditch. Diversion structure consists of a 24 feet (L) x 3.6 feet (H) dam. Intake (2.7 x 1.05 feet, W x H) and sluice gate (3.1 x 2.5 feet, W x H) situate on the left bank. The dividing wall between the gravel basin and the ditch has an opening with diameter of 0.7 feet. Paakea Stream had ponded water downstream of the diversion. 6. Waiohue Stream, K-13 intake into Koolau Ditch. The intake (2.4 x 2.1 feet, W x H) is further upstream from the sluice gate (1.4 x 5.9 feet, W x H). Water flows from a waterfall into the plunge pool, where it is diverted into the intake grate and then through a short tunnel into the gravel basin downstream from the intake. The dividing wall of the diversion structure has two openings with diameters 1.3 feet and 0.8 feet diameter. 7. Puakaa Stream, K-14 intake into Koolau Ditch. Diversion structure consists of a 46 feet (L) x 2.3 feet (H) dam. Intake (5.7 x 5.2 feet, W x H) and sluice gate (2 x 4 feet, W x H) situate on the left bank, with the sluice gate further downstream from the intake. The dividing wall between the gravel basin and the ditch has an opening with diameter of 1.6 feet. Puakaa Stream was dry downstream from the diversion. 8. Kopiliula Stream, K-15 intake into Koolau Ditch. Diversion structure is located by Hana Highway and consists of a 25.5 feet (L) x 2 feet (H) dam. Intake | | |

and sluice gate situate on the left bank. Water from Kopiliula flows downstream and co-mingles with the ditch water (diverted from Makapipi, Hanawi, Kapaula, Waiaaka, Paakea, Waiohue, and Puakaa Streams) in the gravel basin and then flows back into the Koolau Ditch (tunnel) on the left bank. Kopiliula Stream had ponded water downstream from the diversion.

9. East Wailuaiki Stream, K-16 intake into Koolau Ditch.

Diversion dam consists of two walls, one man-made dam (34 feet – L, 4.4 feet – H), and a natural dam (61 feet – L, 5.5 feet – H). Intake (5 x 4 feet, W x H) and sluice gate (3 x 2 feet, W x H) situate on the left bank. The dividing wall between the gravel basin and the ditch is 42 feet (L) x 5 feet (H) and has two openings. East Wailuaiki Stream had ponded water downstream from the diversion.

10. West Wailuaiki Stream, K-17 intake into Koolau Ditch.

Diversion structure consists of a 30 feet (L) x 2 feet (H) dam. Intake (4.5 x 3 feet, W x H) and sluice gate (5.5 x 3 feet, W x H) situate on the right bank. The dividing wall between the gravel basin and the ditch is 33.5 feet in length. Water flows down a waterfall into a tunnel that runs further downstream into the intake and sluice structures. Past the diversion, water flows down a waterfall. West Wailuaiki Stream had ponded water downstream from the diversion.

Staff concluded the field visit at 1630 hours.

Image Listing: (Attach PDF of image contact sheet)

| File Name: | Brief Description: |
|-------------------|--|
| 20100202001 | Small waterfall on Makapipi Stream upstream of K-1 intake into Koolau Ditch. |
| 20100202002 | Diversion structure (K-1 intake) on Makapipi Stream. Intake and sluice gate on the left bank. |
| 20100202003 | Downstream view of Makapipi Stream from the diversion structure. |
| 20100202004 | Makapipi Stream downstream of diversion. |
| 20100202006 | K-1 intake into Koolau Ditch on the left bank of Makapipi Stream. |
| 20100202007 | Diversion dam on Hanawi Stream. |
| 20100202008 | Minor diversion and sluice gate on the right bank of Hanawi Stream. |
| 20100202009 | Hanawi Stream upstream of diversion. |
| 20100202010 | Diversion structure (K-4 intake) on Hanawi Stream. |
| 20100202011 | Minor diversion on Hanawi Stream. |
| 20100202013 | Hanawi Stream downstream of diversion. |
| 20100202014 | K-4 intake into Koolau Ditch on the right bank of Hanawi Stream. |
| 20100202016 | Hanawi Stream downstream of diversion with water flowing past the sluice gate. |
| 20100202018 | Kapaula Stream about 150 feet downstream of diversion. |
| 20100202019 | Diversion dam on Kapaula Stream. |
| 20100202020 | Kapaula Stream immediately downstream of diversion dam. |
| 20100202021 | Kapaula Stream upstream of diversion. |
| 20100202022 | K-7 intake into Koolau Ditch on the right bank of Kapaula Stream. |
| 20100202025 | K-7 intake into Koolau Ditch on the right bank of Kapaula Stream. |
| 20100202031 | K-9 intake into Koolau Ditch on Waiaaka Stream. Water drops directly into the open ditch. |
| 20100202032 | K-9 intake into Koolau Ditch on Waiaaka Stream. Water drops directly into the open ditch. |
| 20100202033 | Waiaaka Stream upstream of the diversion. |
| 20100202034 | Waiaaka Stream downstream of the diversion. |
| 20100202036 | Diversion dam on Paakea Stream. K-10 intake and sluice gate on the left bank of the stream. |
| 20100202037 | Gravel basin and sluice of the diversion structure (K-10 intake) on Paakea Stream. |
| 20100202038 | Paakea Stream upstream of diversion. |
| 20100202039 | Paakea Stream downstream of diversion. |
| 20100202040 | CWRM staff measuring the dimensions of the control gate at the K-10 intake on Paakea Stream. |
| 20100202042 | CWRM staff measuring the dimensions of the sluice gate at the diversion structure (K-10 intake) on Paakea Stream. |
| 20100202043 | CWRM staff measuring the diameter of the opening on the dividing wall of the diversion structure (K-10 intake) on Paakea Stream. |
| 20100202048 | K-13 intake into Koolau Ditch on Waiohue Stream. |
| 20100202053 | Waterfall and pond at the Koolau Ditch K-13 intake on Waiohue Stream. |
| 20100202054 | Close up of K-13 intake into Koolau Ditch on Waiohue Stream. |
| 20100202059 | Gravel basin and K-13 intake on Waiohue Stream. |
| 20100202062 | Dividing wall at the diversion structure (K-13 intake) on Waiohue Stream. |
| 20100202063 | K-14 intake into Koolau Ditch on the left bank of Puakaa Stream. |
| 20100202064 | Puakaa Stream upstream of diversion. |
| 20100202065 | Puakaa Stream downstream of diversion. |
| 20100202068 | Gravel basin, control gate, and sluice gate downstream of the main K-14 intake on Puakaa Stream. |
| 20100202069 | Gravel basin, control gate, and sluice gate downstream of the main K-14 intake on Puakaa Stream. |
| 20100202070 | Channel where water from the sluice gate flows down into Puakaa Stream. |
| 20100202074 | Diversion structure (K-15 intake) on Kopiliula Stream. |

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|-------------|---|
| 20100202075 | Diversion structure (K-15 intake) on Kopiliula Stream. |
| 20100202077 | Kopiliula Stream upstream of diversion. |
| 20100202079 | Kopiliula Stream downstream of diversion. |
| 20100202080 | K-15 intake into Koolau Ditch on the left bank of Kopiliula Stream. |
| 20100202082 | Sluice gate on the left bank of the diversion structure (K-15 intake) on Kopiliula Stream. |
| 20100202083 | Diversion structure (K-16 intake) on East Wailuaiki Stream. |
| 20100202084 | Gravel basin of the diversion (K-16 intake) on the left bank of East Wailuaiki Stream. |
| 20100202085 | K-16 intake into Koolau Ditch on the left bank of East Wailuaiki Stream. |
| 20100202087 | East Wailuaiki Stream downstream of diversion. |
| 20100202089 | Dividing wall and gravel basin of the diversion (K-16 intake) on the left bank of East Wailuaiki Stream. |
| 20100202091 | Sluice gate at the diversion structure (K-16) on the left bank of East Wailuaiki Stream. |
| 20100202092 | Sluice gate at the diversion structure (K-16) on the left bank of East Wailuaiki Stream. |
| 20100202095 | East Wailuaiki Stream downstream of diversion. |
| 20100202097 | Koolau Ditch diversion structure (K-17 intake) on West Waikuaiki Stream. |
| 20100202098 | Koolau Ditch diversion structure (K-17 intake) on West Waikuaiki Stream. |
| 20100202099 | K-17 intake (right bank) into a short tunnel on West Wailuaiki Stream. |
| 20100202100 | Diversion dam on West Wailuaiki Stream. |
| 20100202101 | Gravel basin and sluice gate of the diversion structure (K-17 intake) on the right bank of West Wailuaiki Stream. |
| 20100202104 | West Wailuaiki Stream by the EMI access road. |
| 20100202105 | Gravel basin and sluice gate of the diversion structure (K-17 intake) on the right bank of West Wailuaiki Stream. |
| 20100202106 | West Wailuaiki Stream downstream of diversion intake. |
| 20100202107 | Diversion structure (K-17 intake) on West Wailuaiki Stream. |
| 20100202111 | Waterfall on West Wailuaiki Stream upstream of diversion by the bridge. |

GPS Listing:

Shapefiles: (List file names of all shapefiles created and a brief description of each)

| | |
|--------------------------|----------------------------------|
| <u>File Name:</u> | <u>Brief Description:</u> |
|--------------------------|----------------------------------|

Waypoints: (List all waypoints in decimal degrees and provide a brief description of each)

| | | | |
|----------------------|------------------------|-------------------------|----------------------------------|
| <u>WP No.</u> | <u>Latitude</u> | <u>Longitude</u> | <u>Brief Description:</u> |
|----------------------|------------------------|-------------------------|----------------------------------|

Attachments:

Brief Description:

1. Image Contact Sheet
2. Diversion Sketches

Recommendations:

IMAGE CONTACT SHEET



20100202001.jpg



20100202002.jpg



20100202003.jpg



20100202004.jpg



20100202006.jpg



20100202007.jpg



20100202008.jpg



20100202009.jpg



20100202010.jpg



20100202011.jpg



20100202013.jpg



20100202014.jpg

IMAGE CONTACT SHEET



20100202016.jpg



20100202018.jpg



20100202019.jpg



20100202020.jpg



20100202021.jpg



20100202022.jpg



20100202025.jpg



20100202031.jpg



20100202032.jpg



20100202033.jpg



20100202034.jpg



20100202036.jpg

IMAGE CONTACT SHEET



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20100202063.jpg

IMAGE CONTACT SHEET



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IMAGE CONTACT SHEET



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20100202101.jpg

IMAGE CONTACT SHEET



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20100202106.jpg

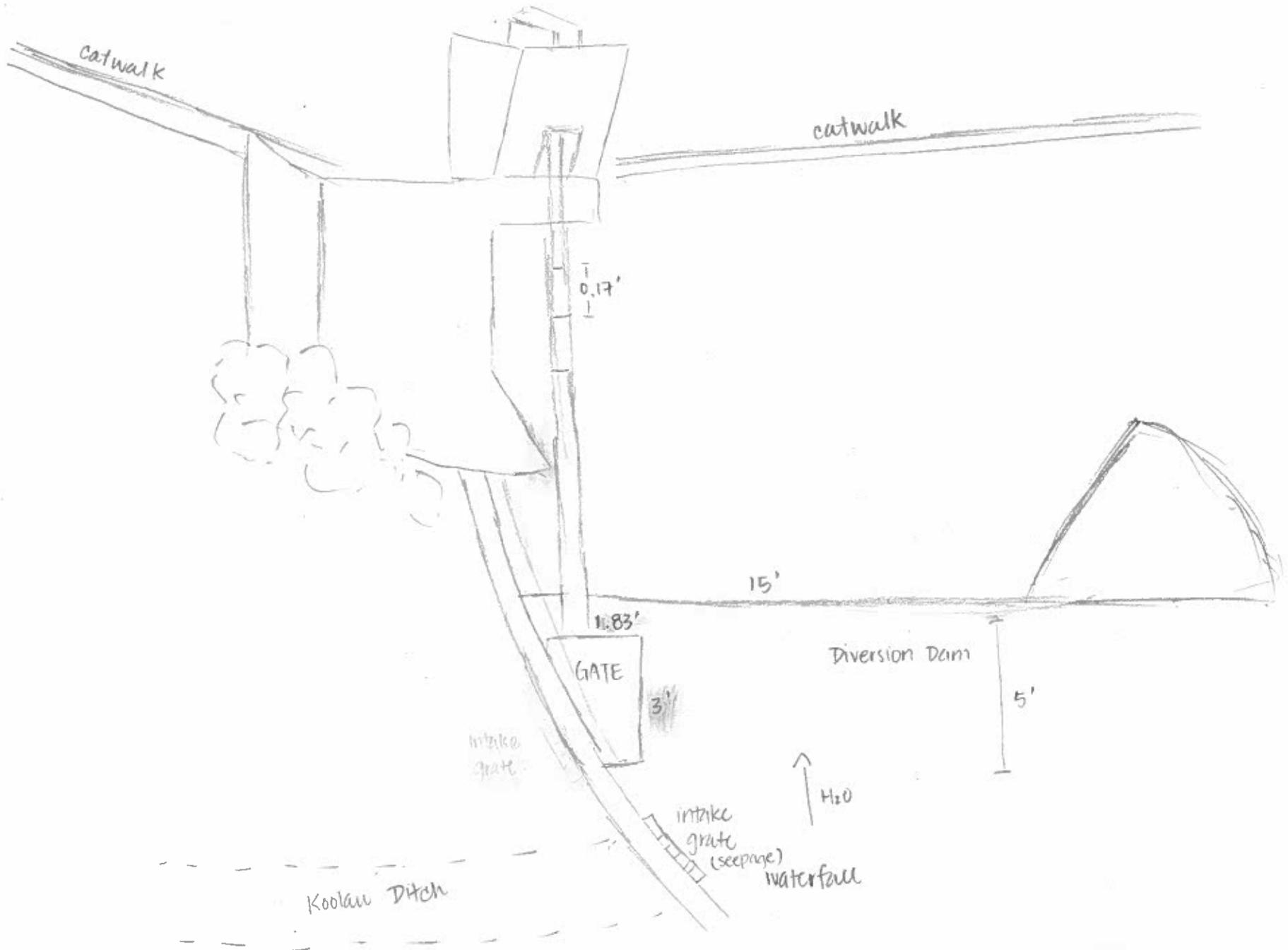
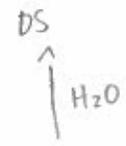


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DIVERSION SKETCH

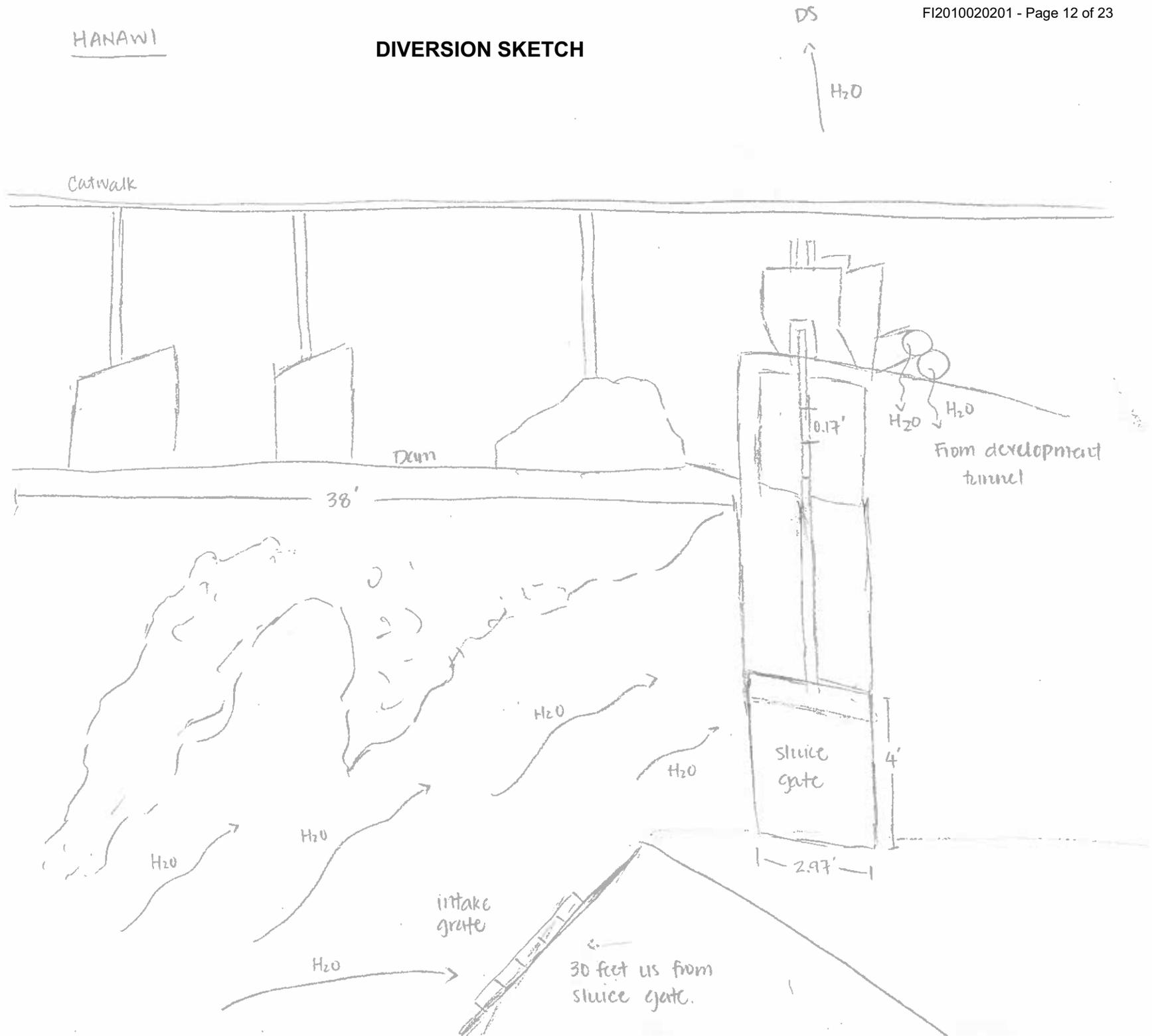


DIVERSION SKETCH

- x sink hole by highway
- x mostly open

HANAWI

DIVERSION SKETCH



DIVERSION SKETCH

- x gate was open by mistake.
- x with water, critters can climb up diversion
- x waterfall upstream.
- x how long is dry reach below diversion?

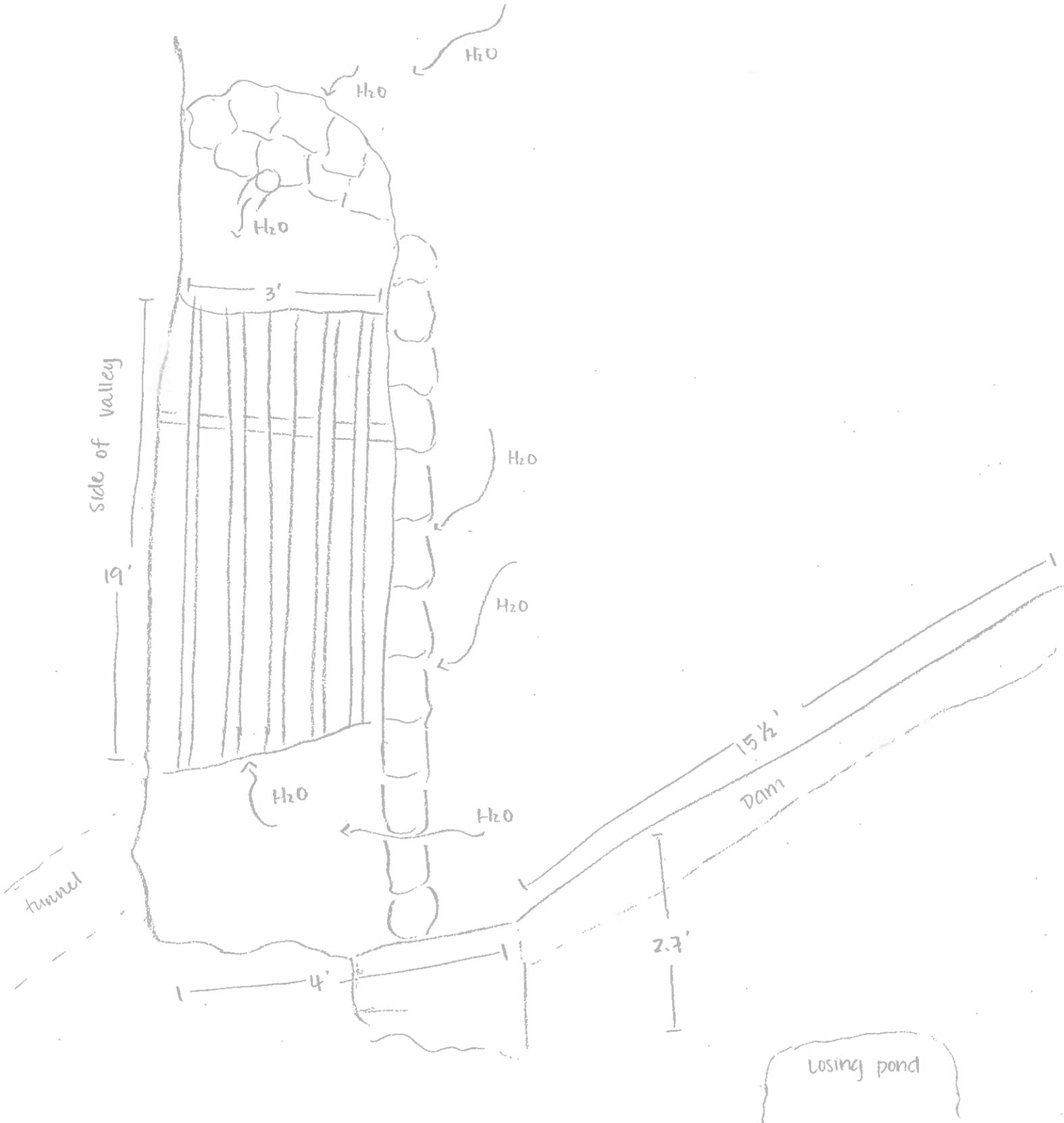
DIVERSION SKETCH

KAPAUULA

US



cascading falls (small)

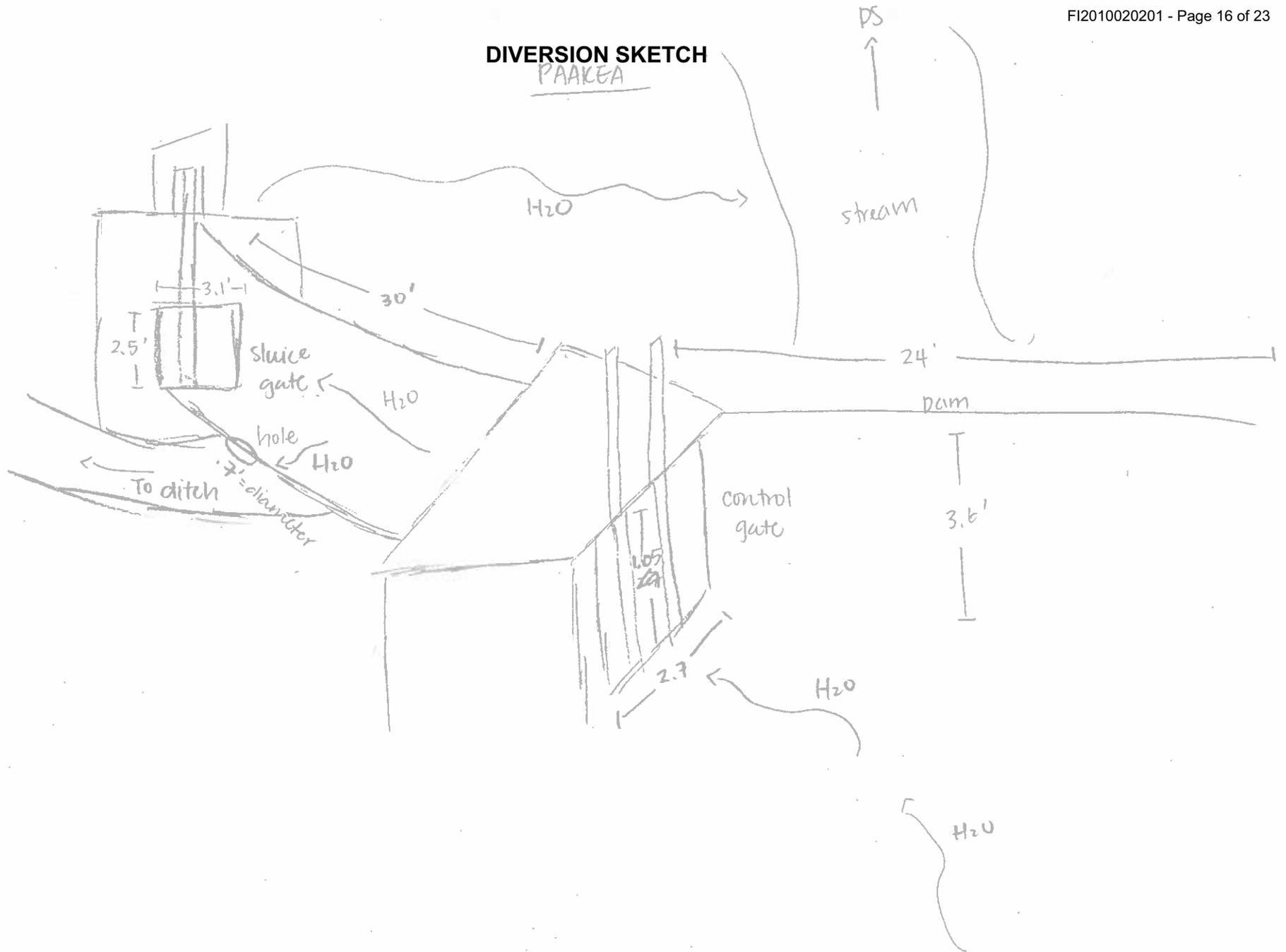


DIVERSION SKETCH

- x losing section downstream so moved dam further upstream.
- x no sluice gate.

DIVERSION SKETCH

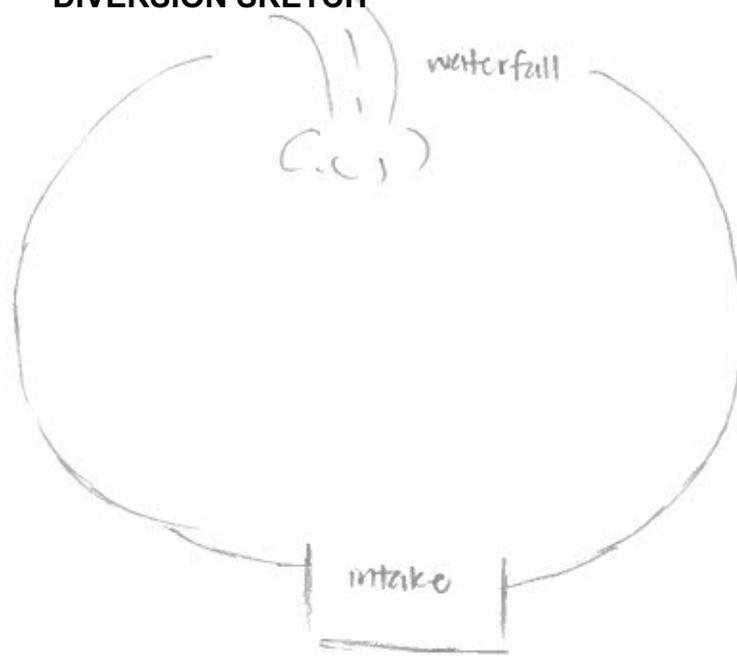
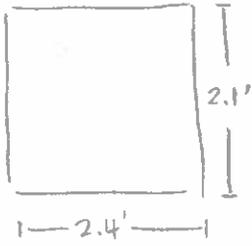
PAAKEA



WAIOHUE

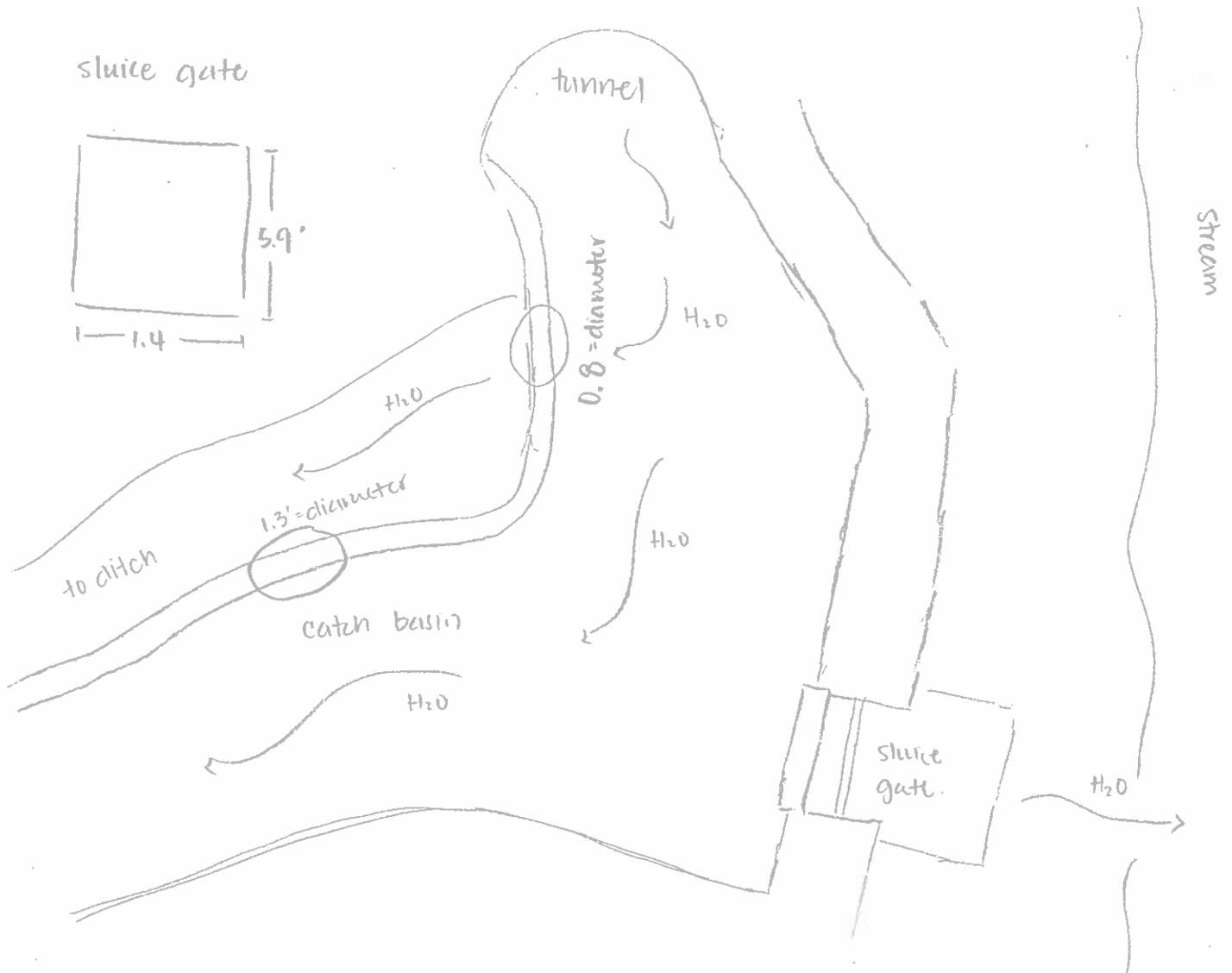
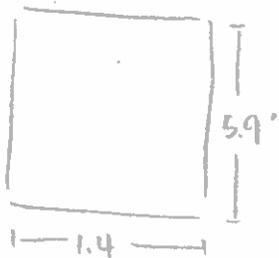
DIVERSION SKETCH

intake grate



x tunnel

sluice gate

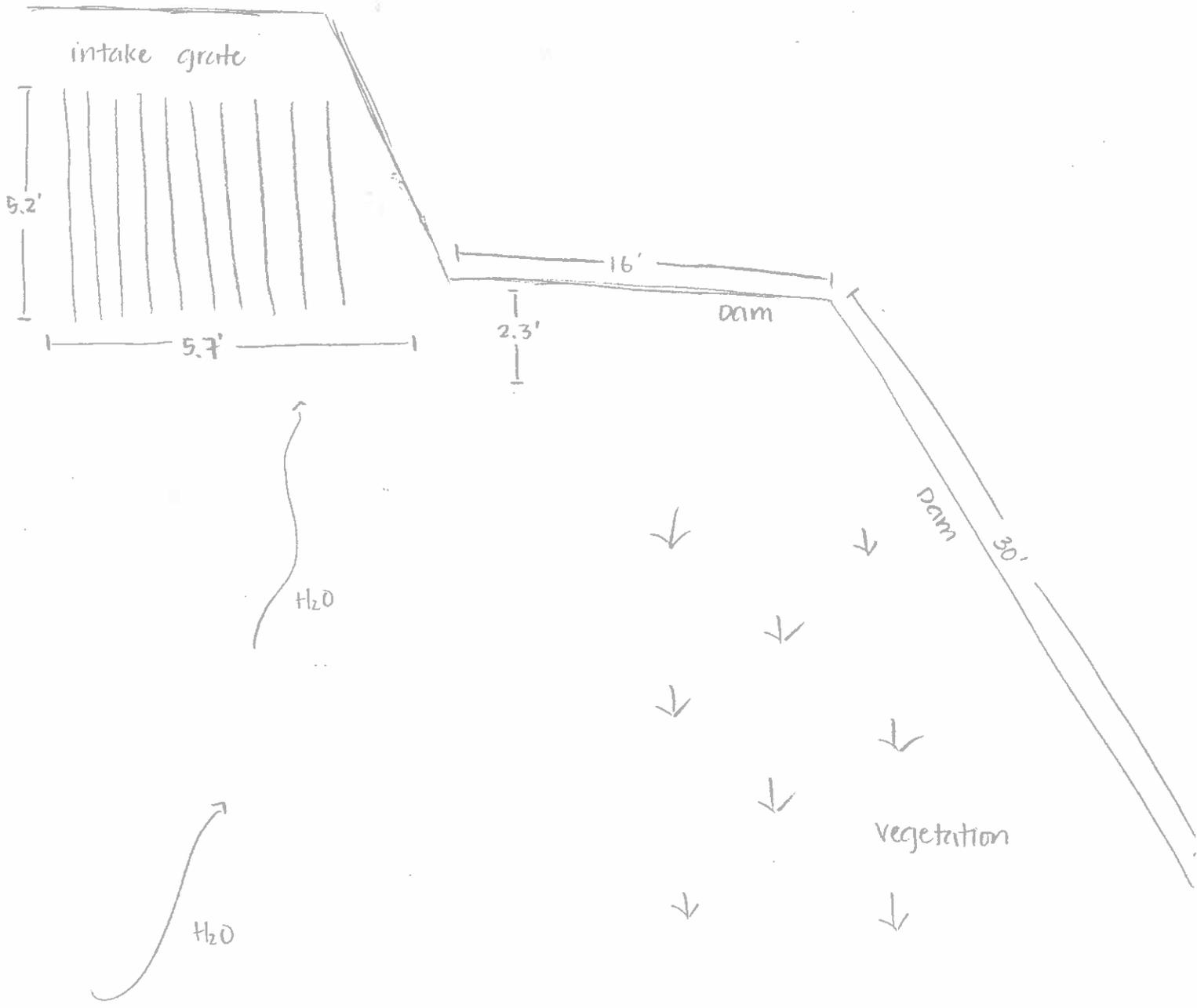


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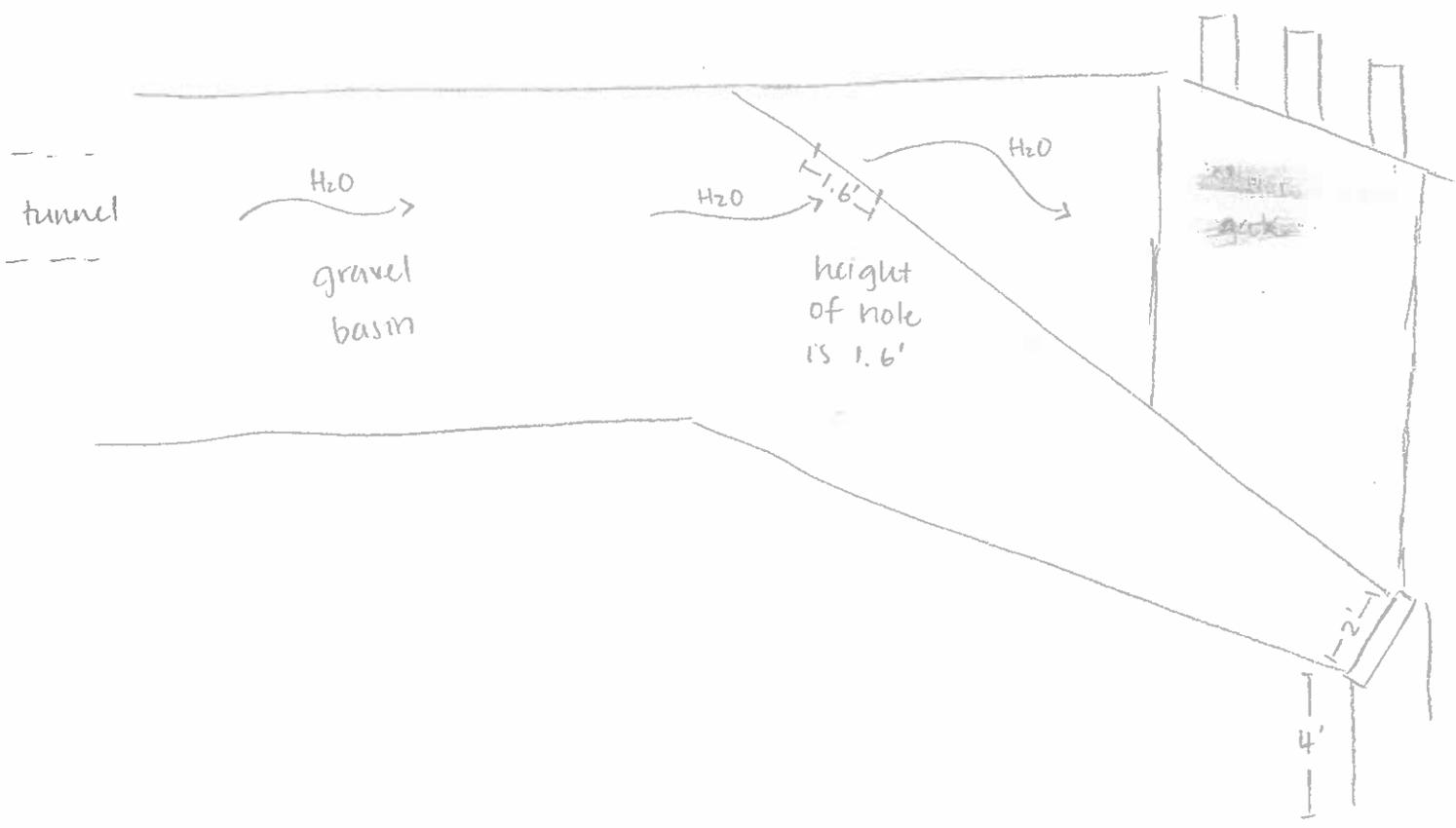
PUAKAA

x sluice gate DS.
@ cliff location

DS
↑

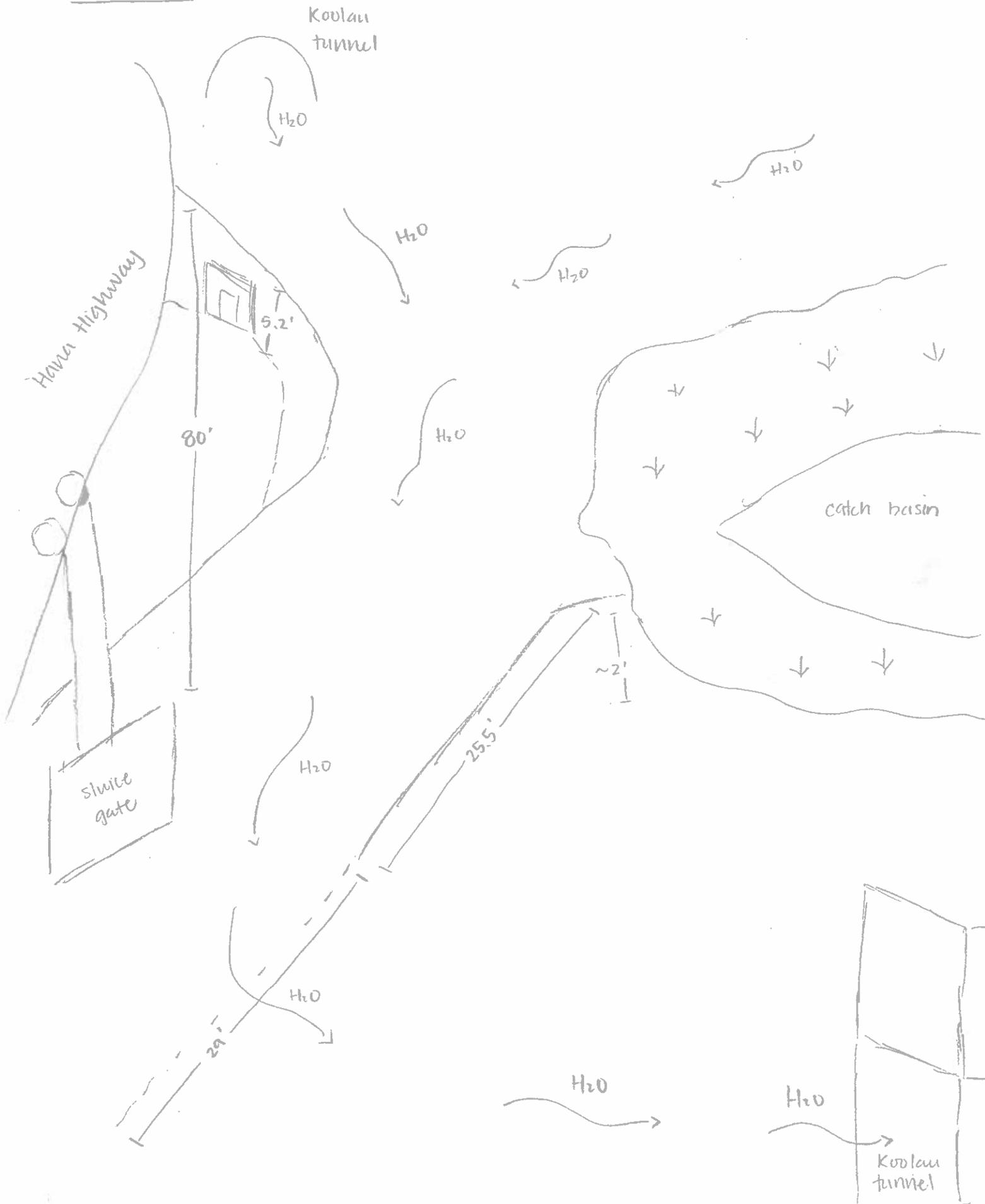


DIVERSION SKETCH



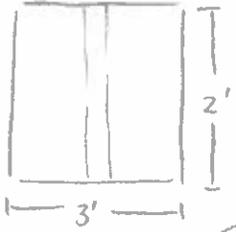
KOPILIULA

DIVERSION SKETCH

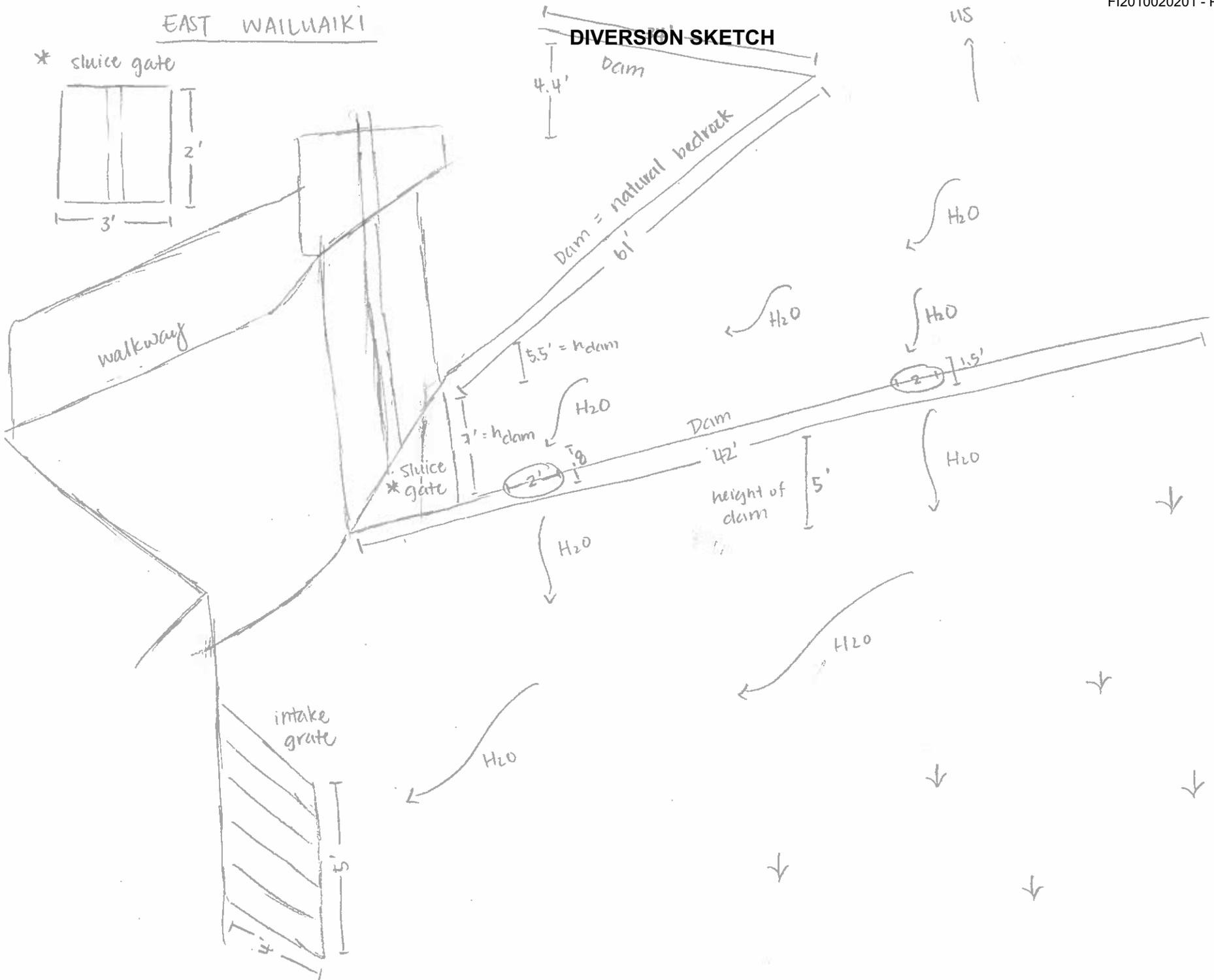


EAST WAILUAIKI

* sluice gate

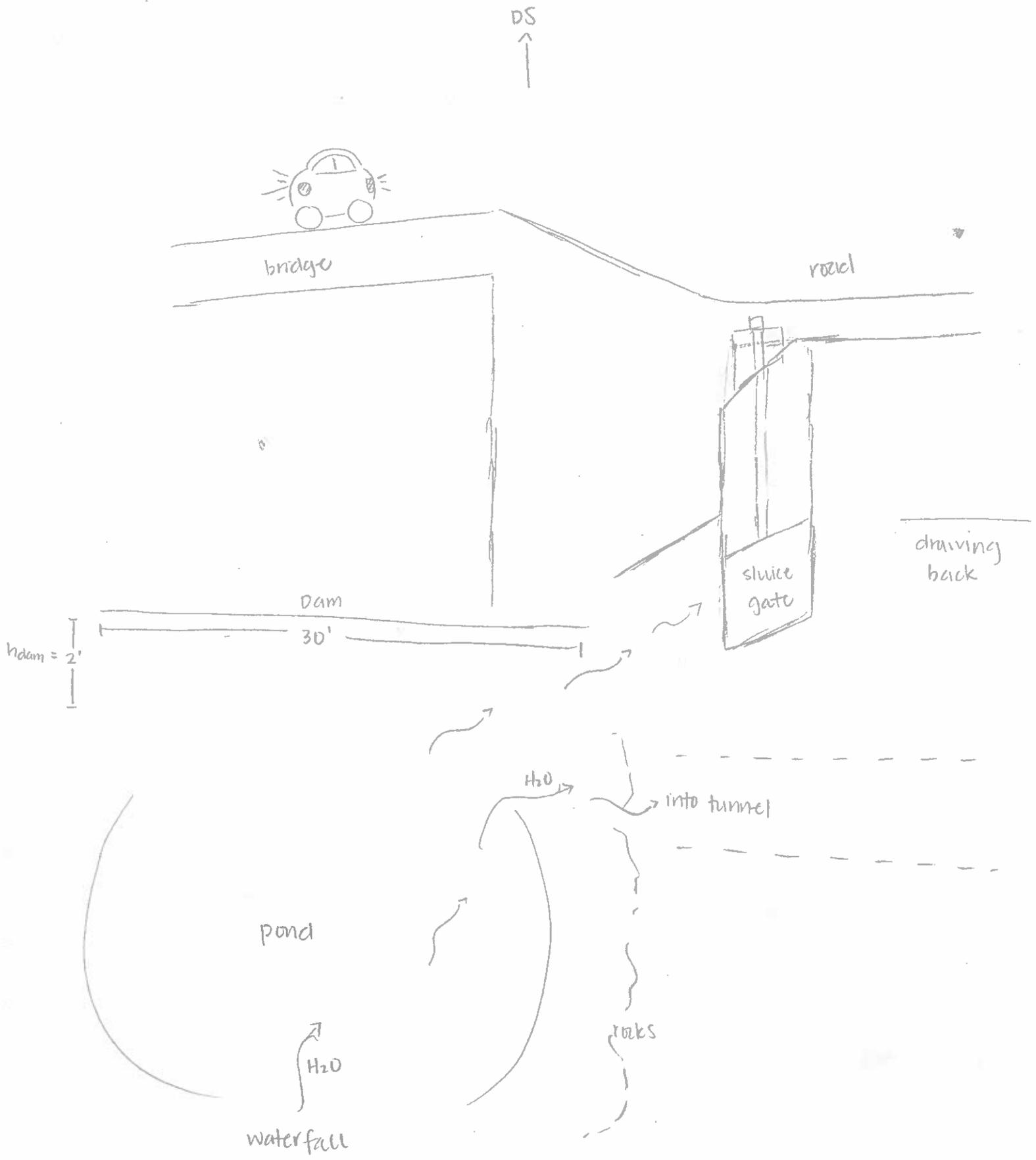


DIVERSION SKETCH



WEST WAILUAIKI

DIVERSION SKETCH



x waterfall downstream of bridge.

DIVERSION SKETCH

LIS
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